THE

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OF

THE ASIATIC SOCIETY

OF

BENGAL.

VOL. II.

THE

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OF

THE ASIATIC SOCIETY

OF

BENGAL.

EDITED BY

JAMES PRINSEP, F. R. S.

SECRETARY OF THE ASIATIC SOCIETY.

VOL. II.

JANUARY TO DECEMBER,

1833.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease."

SIR WM. JONES.

Calcutta:

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1833.

PREFACE.

On completion of this second volume of the Journal of the Asiatic Society, the Editor feels it to be due to his subscribers, as well as to himself, to lay before them as briefly as possible, the results of the arrangements which he contemplated carrying into effect at the conclusion of the last volume;—more especially as a somewhat erroneous estimate of the cost and circulation of the Journal found admission into a late notice of the Indian Periodical Press, drawn up by the Editor of one of the morning papers. The Journal is not published, as there stated, by the Asiatic Society, but solely at the cost and responsibility of the Secretary, who was Editor of it before he enjoyed the honour of an election to that office. Since there never has been the least view to profit, either in the Gleanings or in the present work, there can be no object whatever in concealing any information respecting its publication; and it may be useful hereafter to find on record a note of the expences of printing, and the difficulties against which a Journal exclusively scientific has had to contend, as well as the advantages which it has enjoyed, in India at the present time. The following particulars have therefore been extracted from the accounts of the two years now terminated.

The amount of subscriptions to the Journal at one rupee per number, including two extra numbers, in 1832, was	Rs.	5148 8
From this, deducting 20 per cent. commission paid to Messrs. Thacker and Co. for circulating it, ...		1028 11
There remained net subscriptions available,	Rs.	4114 13
The Baptist Mission Press charged for printing and stitching 500 copies,	Rs. 3742 10	
And the 15 plates cost with printing,	416 5	
	Total	4178 5

The result of the first year exhibits a sufficient accordance between outlay and return. Of the amount subscribed however, only Rs. 3786 13 have been collected up to the present time, so that in fact there was a deficit of Rs. 392 2.

The alterations which the Editor proposed and completed for the second year were:—

1. The saving of nearly half of the commission paid for the mere circulation of the work (without responsibility), by undertaking that duty with the aid of his establishment as Secretary of the Asiatic Society;

2. As a return for this favor, he proposed circulating the Journal gratis to such of the paying members as should express a desire to take it in.

The effect of this scheme has been as follows:

Fifty members of the Society have availed themselves of the privilege, which has made a deduction to the same amount from the monthly receipts. The number of copies circulated, including those sent to subscribers and societies in Europe, is about 450.

The number of paying subscribers on the list, is 320, which at 1 R. per month, (including one extra number of Buchanan,) would give Rs. 4480.

The expenses of printing 500 copies, of 670 pages,

at 4-5 per page, may be stated at	Rs.	2,890
144 pages of Buchanan, at 4-8 per page,.....		648
Covers, table work, &c. charged extra, ...		250
40 pages of Appendix, at 5 Rs.....		200
28 plates (18 lithographs, 10 engravings*), ...		480
Establishment for circulation, ...		600
	——	5,068

Leaving a loss on the year of Rs. 588, or nearly as much as the subscriptions of the members exempted from paying.

But it must be mentioned, and mentioned with a degree of disappointment which is almost disheartening, that of the flattering list of sub-

* For these the cost of printing and paper only is charged.

scribers above given, 70 have not paid any part of the year's subscription, and as many more are still in arrears; so that a balance of Rs. 1321-8 still remains to be collected. The actual state of the concern is therefore by no means so favorable as could be wished, for it leaves the Editor out of pocket upwards of 2000 Rs. as the reward of his labour for two years ! B əɥ ʇnwill not for a moment suppose that the balances outstanding are not recoverable: on the contrary the principal difficulty lies in the distance, and the supposed want of a mode of remittance.—Many subscribers are not aware, that letters containing hoondees for the amount may be transmitted *post free* to the Editor.

It will be remembered, that the Bengal Government were pleased to bestow the privilege of free postage on the GLEANINGS and on the JOURNAL, on condition of the publication of the late Dr. Buchanan's Statistical Reports. Under the impression (justly formed) of a corresponding increase of circulation, consequent upon this liberal boon, it was resolved not to incorporate these records in detached notices in the JOURNAL, nor to diminish from its original matter*, but to publish them as a separate work; and one volume has accordingly been completed, containing 356 pages, which at 4-8 per page have cost Rs. 1,602

And a reprint of the first 108 pages, which became necessary on the subsequent extension of the edition from 300 to 500 copies, 216

Total, Rs. 1818

This expence has been incurred therefore on account of Government, in return for the postage saved, not to the work, but to the subscribers of the JOURNAL. On the completion of the first volume of BUCHANAN, a second extra volume of an official nature on the Monetary System was commenced, of which 50 pages have been printed with 3 plates, being in fact an expence of more than 300 rupees not included in the above estimate. The Government meantime placed the remaining volumes of Buchanan in the Editor's hands, with an intimation of its "desire that the printing of these records should be continued." It was therefore with no small feeling of mortification that

* Originally 32 pages only were given in each number, latterly 64.

the EDITOR perused the following letter, announcing that the privilege of free postage should cease from June next, especially after having been honored, on an explanation of the nature of the work, with an extension of the same privilege to the Madras presidency, in addition to that formerly bestowed by the Governors of Bombay and Ceylon.

To JAMES PRINSEP, Esq.

Editor of the Journal of the Asiatic Society,

Genl. Dept.

Sir,

I am directed to inform you, that the Governor General in Council has resolved, that after six months the exemption from postage, which is now enjoyed by the Journal of the Asiatic Society, shall be discontinued.

I have the honor to be,
Sir,
Your most obedient servant,
G. A. BUSHBY,
Offg. Sec. to Govt.

Council Chamber,
2nd Dec. 1833.

It may reasonably be feared that many subscribers at distant stations may be unable to continue their support to the work, when its cost shall be enhanced by postage; but (should it be impossible, on a proper and respectful representation of the circumstances, to avert the imposition of postage) every means will be taken of lessening the burthen by sending the monthly numbers by the bangy instead of the regular dâk.

On the contents of a volume which has already been perused by nearly all to whom it circulates, it would have been obviously needless to make any remark, were it not desirable to prove that the favors hitherto conferred upon the work by the Government of the country had not been altogether misapplied.

Independently of the volume of Dinajpur Statistics, which forms a model for the use of public officers engaged in collecting similar information, the GLEANINGS and the JOURNAL have been the means of bringing to notice many of the mineral resources of our vast Indian Empire, and of leading to fresh discoveries by the announcement of what had already been found: coal may be adduced as an example,—of which twenty or more different localities have been brought to our knowledge through its pages, where only two were before known. Of the native mineral productions, iron, copper, gold, &c.:—Of the native arts and manufactures, salt, nitre, turpentine, dyes, mills, &c. numerous original ac-

counts have been inserted : catalogues of woods, medicinal plants and drugs : experiments on materials, wood, iron, cement ;—Statistical reports ;—descriptions of newly explored countries and people :—in fact, it would be difficult to open a number of the JOURNAL without finding some information which must possess value in the eyes of a government. Contributions of a more exclusively scientific nature have, in the mean time, continued to multiply, and the objects pointed out as desiderata at home in the geography, meteorology, geology, and natural history of this country, are in the course of rapid and systematic elucidation. So numerous for instance have been the registers of the weather offered for publication, that space could only be found for abstracts of many. There has hardly been time for the collection of materials regarding the tides of the Indian coasts, suggested in the Rev. Professor WHEWELL's circular, (inserted in page 151,) but the attention of those who have opportunities of eliciting the information required, is again solicited to this object.

As a proof of the benefit conferred on science by the free and extensive circulation of a periodical devoted to such objects, the Editor feels pride in alluding to the ardour which his plates of ancient coins have inspired in many active collectors, and above all to the reward bestowed on himself by the munificence of General VENTURA, the most successful pursuer of antiquarian research in the Panjáb, who has presented to him all the coins and relics discovered on opening the celebrated Tope of Manikyala. They are now on their way to Calcutta.

That extracts and analyses of European science have not been more frequent must be attributed once more to want of space and want of leisure. The Editor would recommend all who seek for knowledge of the progress of science in Europe to procure a copy of the Reports of the British Association for 1832, in which they will find every branch discussed by the philosopher best able to give it illustration. To attempt to shorten those admirable essays would be mutilation rather than abridgment ; yet unfortunately most of them are too long for the pages of a monthly journal.

On the subject of orthography of native words, the Editor is driven to make one concession, for which he fears the learned Societies at home

will denounce him as an apostate to the system of their leader. Every communication, with hardly any exception, which comes for publication, adopts the Gilchristian mode of spelling, or that modification of it which has been *ordered* to be used in all Government records, surveys, &c. An attempt has been made hitherto to conform the whole to Sir William Jones' method, but necessarily there have been continual omissions, and the contributors in most cases express themselves but ill pleased to see their words transformed into shapes but ill accordant with ordinary *English* pronunciation. The Editor has therefore resolved to adopt the middle course followed in Hamilton's Hindustan, namely, to print all Indian names and words in the ordinary roman type as they are usually written and pronounced, and to place in italics all such native terms and proper names, as are corrected, and spelt according to the classical standard of Sir William Jones: in many cases the latter may be inserted in brackets after the ordinary word.

Where contributors have occasion to illustrate their papers by plates, it will be a great convenience to the Editor to have the original drawings prepared of the same dimensions as the printed page of letter press, to save the trouble and expence of reducing them.

The Editor will not allude in this place to the severe loss he has sustained in the death of some of the most able and constant supporters of his work, and the departure to Europe of others in the course of the past year; since he hopes that a more worthy channel will be found for the record of their meritorious labours for the cause of Science in India, in the Proceedings of the Asiatic Society, to which their names belong, and in which their reputation must ever be cherished with fond remembrance.

1*st January*, 1834.

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No. 16.—*April*, 1833.

I.—*Account of the Jain Temples on Mount Abú in Guzerát. By* Lieut. Burnes, *Bombay Army.*

The mountain of *Abú*, *Abují*, or *Abúghad*, is situated near the 25th degree of north latitude and 73° 20′ of east longitude, in the district of *Sekrúí* and province of *Márwár*, about 40 miles N. E. by E. of the camp of *Dísa*. The magnificent temples are erected at the small village of *Dilwarra*, about the centre of the mountain, which has an elevation of about 5000 feet, where the summit is extremely irregular and studded with peaked hills. There are four in number, all of marble, and two of them of the richest kind. They are dedicated to Párasnáth, or "the principal of the deified saints, who according to their creed have successively become superior gods," and who are believed to amount to the number of twenty-four, or as some told me, to have appeared, like the Hindú gods, in twenty-four different *Avatárs*.

These are the gods of the *Jain*, *Shráwak*, or *Banian* castes, who are a gloomy tribe of atheistical ascetics, not unlike the Budhists, "who deny the authority of God and a future state; believe that as the trees in an uninhabited forest spring up without cultivation, so the universe is self-existent; and that the world, in short, is produced, as the spider produces his web, out of its own bowels; and that, as the banks of a river fall of themselves, there is no supreme destroyer." "They also deny the divine authority of the *Védas*, and worship the great Hindú gods as minor deities only:" but Mr. Colebrooke and other eminent scholars have already given the most minute description of this class of people and their worship. The above abstract of their tenets will at once show how little acceptable the followers of Párasnáth can be to orthodox Hindús; and the costly materials of Jain temples are therefore attributable, not to the holiness of the gods to whom they are de-

dicated, but to the riches that are to be so generally found among the *Banians* their votaries.

Jain temples are to be met with in *Guzerát*, *Kattywár*, *Cutch* and *Parkur*, as well as in other countries both in the southern and northern parts of the Peninsula, but next to those on *Abú*, the most celebrated ones on the western side of India, are at *Politana* and *Girnar* in *Kattywár*, at both of which places also they have been built on the tops of hills. The antiquity of the schism between this and the Hindú sect is not accurately ascertained, but the oldest temple on *Abú* appears to have been built An. Vicramajit 1016, (A. D. 960,) or something more than eight hundred years ago.

The temple now alluded to is dedicated to Rikabdeo, (or as Mr. Ward has it, "Rishubhu-devu,") the founder of the sect and first in order of their deified saints, and is known by the name of *Adísurjí deval*. The four temples are built in the form of a cross, and this is the most westerly. It is in the figure of an oblong square, forty four paces long by twenty two wide (or perhaps 100 feet by 50); within the building, and in the centre of the area so inclosed, stands the pagoda, in which the great image of the god is placed facing eastward. In front of this there is an octagon of 24 feet, supporting, on pillars and arches of marble, a cupola of the same. The pillars may be from 12 to 15 feet high. The entrance to the temple is from a small door opposite this cupola, and the grandeur of the building is discoverable at once on entering it, and has a very imposing effect. On all sides of the area there is a colonnade, the long sides having a double row of pillars supporting small domes, within each of which are cells in the walls to the number of 56, in all of which are marble images of the god. In the south west corner, and in a chamber detached from the building, is a colossal figure of Ne'minath cut in black stone.

The whole of the building is of the richest white marble, superbly cut into numerous devices; and it is worthy of remark that there is not an inch of stone unornamented, and not two domes of the same pattern, though one hundred and thirty-three in number, and all are carved. The grand dome is a most chaste piece of workmanship, and so light do the pillars appear, that it could hardly be imagined they could support the superincumbent weight.

Adjoining to this building is a room called "*Háthísál*" or the elephant hall, which seems once to have also had a roof of domes, and in which are the figures of ten marble elephants with drivers, each about four feet high, and caparisoned in the modern style of those of the Native princes, with every rope, tassel and cloth beautifully and correctly carved,

and apparently, the cars and riders excepted, from one block of marble. The workmanship is exceedingly good, and the representation of the animal is very superior to Indian sculpture in general.

The floor of this room is of black marble, while that of the temple is of white. At the door there is a large equestrian statue of the founder, who by an inscription, is described as " Bi'malnáth, a *Banian* of *Chandoulí* to whom the gods had been propitious." It is rudely executed, and is evidently the workmanship of later days.

The whole of this temple is said to have occupied a period of fourteen years in building, and to have cost eighteen crores of rupees, in addition to fifty six lacs spent in levelling the side of the hill on which it is built.

The next temple to be described is the northern one, which is dedicated to Ne'mina'th, the twenty-second deified saint of the Jains. It is with regard to design and material much the same as the one mentioned, but although of equal length it is ten paces wider, from which addition the architect has been able to make the colonnade double on all sides without contracting the area too much, and which has a good effect. The pagoda of the god is in the centre, and faces the west. It has also a cupola in front of it, the same as the other in size, though far inferior in execution : but the greatest ornament in this temple, and indeed on *Abú*, is a portico between this cupola and the pagoda. It is supported by pillars, and the roof is formed by nine small domes most exquisitely carved. The stones on both sides the entrance of the temple are deeper cut than any marble I ever saw, and, if I mistake not, approach in resemblance to Hogarth's line of beauty. This part of the building is said to have cost eighteen lacs of rupees, and I can well credit the people who gave me the information.

All round the temple and in front of the colonnade, small images of the god are placed to the number of forty-six, in front of each of which are two sculptured domes.

The east side of the building is not divided into compartments, but consists of one long room in which are placed ten marble elephants, which are more minutely carved than those described, the very twisting of the ropes being represented. In rear of these are the images of the different contributors to the " holy undertaking," rudely cut out in stone, and represented as holding purses full of money ready to be appropriated. There are inscriptions under all these figures mentioning at length the names of the different " pious individuals," most of whom appear to have been Banians.

In the south western corner of the building are two inscriptions cut in marble and fixed into the wall, but they are in such a good state of preservation that it becomes very questionable if they are of the same age as the temples. They are in the *Bálbad* character, and giving (as I learnt from the people, there being no one who could read them with me,) a genealogical account of the different founders and their relatives. Above the niches containing the smaller images, there are also inscriptions with the names of the builders in *Gúzerátí* character. From all of these it appears that this temple was built, An. Vicr. 1293, or A. D. 1236, nearly six hundred years since, by two brothers, BAST and FEST PÁL, *Banians* also of the ruined city of *Chandoulé*, and one of whom is said to have been *Kámdár* to the Delhi Emperor. The building is said to have cost twelve crores of *Sonias*, a coin equivalent to ten rupees, in addition to the expense of the portico; and although it is superior to the other temple, this is undoubtedly an exaggeration.

The sculpture of the small domes in this pagoda, from being of a higher order of architecture than the others, deserves remark. In several of them are representations of the gods, in particular a group of the procession of INDRA King of the Gods, who is believed to have descended from heaven at the birth, marriage and installation of RIKABDEO; also another of *Neminath's* marriage, both of which are pretty well executed in marble. Nothing more attracted my notice, however, than the group next to the one just described, it being a representation of one of the Mahommedan emperors of Delhí. I observed also that very common ornaments throughout the temple were small Mahommedan tomb-stones.

Superstition has however pre-eminently shown itself in the portico. While admiring its beauty I observed the capital of one of the pillars to be of coarse unpolished black stone, which induced me to ask the cause of such a disfiguration; when the people informed me that it had been done intentionally to keep off the evil eye, as in a place like this where all was beauty, it would inevitably fall and become bewitched if there were no foil. The floor of this temple is of mixed marble, being both black and white; and under the great dome there is a slab of yellow marble, said to have been brought from *Jesalmír*.

The two remaining temples are about 365 years old, and very inferior both as to workmanship and materials when compared with the others. Under the dome of the southern one, there is some attempt at mosaic work, and the floor is inlaid with five different kinds of marble.

The whole of these temples are in a good state of preservation, notwithstanding the attempts that have been made to destroy them. The

tails, trunks, and riders of the elephants have been broken off, though since replaced; and the dome of ADESIRJI'-DEWAL is cracked in one or two places. The earthquake of 1819 is said to have had some effect on these buildings, but although the Brahmans and Jains formerly carried on violent controversies, it does not appear that the former injured the Jain temples. The natives themselves speak with horror of the oppression of a Mahommedan prince known to them by the name of "BOGRA Badshah," who is said to have ordered the temples in *Abú* to be levelled. Natives are at all times but bad chronologists, nor are they in this instance able to give any distinct account either of the time or of the individual whose name excites such irritating feelings.

It is on record however that a Sultan of *Ahmedábád* in *Guzerát*, by name *Máhmúd Begra*, sent a force to levy tribute on the Parsees, A. D. 1450, and from the similarity of names, and the connection that subsisted between two such mercantile places as *Ahmedábád* and *Chandoulí*, it does not appear to me at all improbable that this is the individual*. The hand of time is now however fast injuring these buildings, and throughout the marble gives signs of decay.

Without placing too much reliance on the inscriptions above alluded to, there is a circumstance which goes far to fix the date of these temples at a period when the Mahommedan power was great in India. All the figures are throughout represented with beards, which we know to be at variance with Hindú customs, and which is without doubt attributable to the same cause that induces the Hindú subjects of a Mahommedan government to follow the custom of their rulers, namely, submission to the powers that be. In Sind, at the present time, such is the custom of all Hindús, and it is perhaps owing to this that the Moslem rulers ever spared the temples of the submissive people they conquered. It is to the same cause, I presume, that we have the representation of the emperor of Delhi, though from the founder being his "*Kámdár*," it may be more easily accounted for.

With very few exceptions the people on *Abú* do not worship at the temples of *Dilwárra*, and there are only one or two *Gurjís* at the place, who could give, from sheer ignorance, little or no information concerning the surrounding scene of grandeur. They have, however,

* I should have been more disposed to attribute the injury which the temples of *Abú* have received to MA'HMÚD of Ghizni, who came by Ajmír into Guzerát, in 1024, through *Patan*, and who was so zealous in the destruction of Hindú gods and temples, and has been rendered famous by the demolition of the one at *Patan Somnáth* in Kattywar; but if the inscription be true the whole of these temples, even the oldest of them, are of a posterior date to that conqueror's inroad.

one good quality which our countrymen can well appreciate, a total freedom from all prejudice, so that we entered the "sanctum sanctorum" of the inner temple without a murmur on their part, nor did they object to our handling the gods themselves.

There were besides two inmates of the temples whom I must not omit to mention. They were women who had taken a vow of chastity, retired from the world, and dedicated themselves entirely to religion, or, as they themselves say, had become "*Sadú.*" One of them was young, and had retired on the death of her husband. They spent their time in reading their religious books, which they readily showed, and were quite free from that prevailing reserve in Indian women, so much so that they followed us through the "atria" of the temples, and were ever ready to explain, as far as in their power, the different objects of our curiosity.

It was from them I learnt the names of the twenty-four deified saints or gods of the Jains, which are as follows—1 Rikabdeo,—2 Ajilnath,—3 Sambunáth,—4 Abumandjí,—5 Súmtanáth,—6 Padan Prabú,—7 Supárisnáth,—8 Chanda Prabu,—9 Subatanáth.—10 Sítalnáth,—11 Síansnáth,—12 Wáspují—13 Bímalnáth,—14 Anandnáth,—15 Darnnáth,—16 Santínáth,—17 Kutonáth,—18 Aránáth,—19 Milínáth,—20 Muní Subartjí,—21 Nawínáth,—22 Néminámthjí,—23 Párisnáthjí,—24 Mahávarú, and it is not difficult to distinguish by the expressive affix of "jí," even from among this long list, the favored or favorite gods to whom the temples are dedicated.

I also learned from these people, that there are large assemblages of people on *Abú* at different but unfixed periods, and that they chiefly come from Guzerát, Márwár, Ajmere, Malwa and Bombay, all of which except the latter are, in fact, the surrounding countries. The natives of India are, as it is well known, fond of perching their temples on the tops of hills and other remarkable places; and it is no doubt owing, as well to the isolated situation, as the great size of the mountain, that such a position has been chosen. There is, however, no marble on *Abú*, and certainly at present, no roads by which the enormous blocks of it could have been brought up from the pits that are at the base of the mountain, so that it is to be presumed they have been destroyed.

From some specimens in my possession, it would seem that the summit of *Abú* is granite; but great part of the exposed rocks are in a state of decomposition, and break off in flakes.

The vicinity of *Abú*, though now without a large town, has been, as is discoverable from ruins, and according to tradition, a well cultivated and thickly peopled country.

About nine miles from *Girwar*, a village at the base of *Abú*, and half that distance or less from the *Banás* river, are the ruins of a great and ancient city called "*Chandoulí*," said to have been eighteen miles in circumference, and which is now without an inhabitant.

The natives have numerous fabulous accounts concerning the place, and believe it to have been one of eighty-four towns or villages that were destroyed by "a shower of stones" three hundred years ago; and that a famine and scarcity of fuel ensuing, the people fled to *Guzerát*, and settled at *Ahmedábád*. I myself had not an opportunity of visiting the ruins of this city, but am informed that all its buildings are thrown down as if by an earthquake, the occurrence of which could, I have no doubt, be accurately ascertained by inquiry on the spot. Its antiquity may be readily discovered from the temples on *Abú* having been built by the *Banians* of this once opulent city, as proved by the inscriptions before alluded to, and great numbers of small marble images of PÁRASN'ATH, the same as those on *Abú*, being constantly dug from among the ruins.

II.—*List of Indian Woods collected by* N. Wallich, *M. D. F. R. S., Corresponding Member of the Royal Institute of France, and the Academy of Sciences at Berlin, &c. and of the Society of Arts of London; Superintendent of the Botanic Garden at Calcutta.*

[Re-printed from the Transactions of the Society of Arts, xlviii. 1831.]

Dr. Wallich was sent by the Governor-General of India on several botanical missions, especially in 1820-1, to Nipal, a hilly country situated between the lower part of the valley of the Ganges and the Himalaya mountains, and to the Burmese territory in 1826-7. On each of these expeditions he collected specimens of the native woods, which were sent to England, and deposited at the India House. To these were likewise added some that had been grown in the Botanic Garden of Calcutta. On the arrival of Dr. Wallich himself in England, I had the pleasure of forming a personal acquaintance with him, having before occasionally corresponded with him respecting various Indian products that at different times he had sent to the Society of Arts.

Under an apprehension that the arrangement and description of the vast botanical collection brought over by him, would occupy the whole of his granted time of absence from Calcutta, he suggested that his collection of woods should be transferred to the Society of Arts for arrangement and examination. This plan having been sanctioned by the Court of Directors of the East India Company, between four and

five hundred specimens were placed in our possession. Here they were examined, and were cut up into three or four sets of specimens more or less complete. Some of them were found to be worm-eaten; and several of those from Nipal being only portions of small branches, are not in a state very favourable for shewing the qualities of wood with reference to its value as timber. Their native names, and the scientific ones of those that have any, as well as the uses to which they are applied by the people of the countries where they grow, were supplied by Dr. Wallich*, partly from his own observation, and partly from a catalogue of Burmese woods collected in 1827 by A. Maingy, Esq., and presented by him to Dr. Wallich. Some notices have likewise been obtained from a catalogue of woods sent by Dr. Francis Hamilton (late Buchanan), from Gualpara in Assam, on the Burrampooter, and which were put into the hands of Mr. James Kyd, master builder to the Hon. East India Company at Calcutta, for examination. These notices are distinguished by the letters *Ham.*, though some of Dr. Wallich's are intermixed with them. The observations on the structure of some of the woods from Nipal were made by myself, and relate chiefly to the longitudinal *fibre*, to the medullary *rays*, to the longitudinal *tubes*, and to the annual *layers*. For some practical observations the Society is indebted to the carpenter employed in cutting up the specimens.

A. Aikin, *Sec.*

CATALOGUE OF INDIAN WOODS.

1 Acacia mollis, fr. Nipal.
A large tree: wood yellowish white, shining, coarse, rather soft.—Sp.† 2 inch. diam. Fibres and rays of the same colour, the latter very distinct: tubes large.

2 Acacia fragrans, fr. Nipal.
A large tree.—Sp. 2 inch. diam. Wood glossy, coarse: a bad specimen.

3 Acacia. Joolchumahl, N.‡ fr. Nipal.
Tree very large: wood excellent for chests and boxes.

4 Acacia. Popeeah, B.§ fr. Tavoy.
A very large tree: the wood used for posts, bows, and rollers for ginning cotton.

5 Acacia. Paingadoo, fr. Tavoy.

* It has been thought better to leave the spelling of the native names as in the original catalogue, since it is difficult to know in many cases how they ought to be rendered orthoepically.—Ed.

† Sp. the individual specimen examined.

‡ N. Newar, the language of the Hindú conquerors of Nipal.

§ B. The Burmese language.

6 Acacia odoratissima. Jatikorai, fr. Gualpara.*
Trunk very lofty, but not straight; often 6 feet in girth: wood hard, and used in furniture.—*Ham.*

7 Acacia marginata. Korui, fr. Gualpara.
5 cubits in girth. Makes good planks.—*Ham.*

8 Acer lævigatum. Suslendi, N. Cherouni, P.† fr. Nipal.
30 to 40 feet high: 3 to 4 inches in diameter; of slow growth; used for rafters, beams, and other building purposes.—Sp. 3·5 inches in diam. Wood varied brown and cream colour, with a wavy lustre.

9 Acer sterculiaceum, fr. Nipal.
A very large tree, 3 feet in diameter.—Sp. 3·5 inch. diam. Wood light: fibre pale cream colour, with considerable lustre: rays in distinct brown ribands: tubes large, giving a coarse appearance to the wood.

10 Acer oblongum, fr. Nipal.
A very large tree. Wood moderately hard and compact.—Sp. fibre cream brown, with considerable lustre: rays in narrow ribands of a flesh colour: tubes small.

11 Adamia cyanea. Bansook, P. and N. fr. Nipal.
Wood pale coloured, not used.

Aggur. *See* Aquilaria.

Ain, Aintha. } *See* Dipterocarpus.

12 Ahnaun, fr. Tavoy.
3 to 6 fathoms long; 12 to 15 inches diameter. Yields good crooked timber, the strongest and most durable of any in Tavoy; used for anchors to the largest boats.

Alesi. See Justicia.

13 Alnus nepalensis, fr. Nipal.
Wood as firm as English birch, and of a deeper colour; very hard, and difficult to cut; lustre considerable.—Sp. 5 inch. diam., 20 layers in 1·7 inch (but in another specimen 5 layers in 1·8 inch). Heart pale brownish red: fibre glossy: rays reddish brown, very distinct. Bark fibrous, rather thick, composed of many thin laminæ.

14 Alstonia (Echites) scholaris. Chatiyan, fr. Gualpara.
A beautiful tree, often 3 cubits in girth, used for coarse furniture.—*Ham.*

15 Alstonia antidysenterica (Nerium antidys.). Dudkhuri, fr. Gualpara.
A large tree, often 3 cubits in circumference. Is considered a powerful medicine. Beads are made of it, to be worn round the neck.—*Ham.*

Amari. See Guarea.

16 Anacardium latifolium. Bhela, fr. Gualpara.
Grows to a good size; used for making chests and couches.—*Ham.*

17 Anacardium? Thubbamboo, B. fr. Tavoy.
A large tree, used in boat-building.

18 Andrachne trifoliata. Uriam, fr. Gualpara.
3 cubits in girth, used for coarse furniture.—*Ham.*

19 Andromeda ovalifolia. Angaree, P.; Juggoochal, N.; fr. Nipal.
Grows 1 or 2 feet in diameter: wood soft and spongy, used for fuel.—Sp. wood moderately hard, compact, reddish brown, with some lustre. Bark with layers of stringy fibres.

20 Andromeda formosa. Sheaboge, N. fr. Nipal.
A tree of considerable size.—Sp. 4·5 inch. diam.: wood pale brown, fine-grained, moderately hard; rays very distinct in the outer layers.

* The Gualpara specimens are not as yet in the Society's possession.
† Parbuttea, the language of the natives of Nipal.

21 Andromeda cordata, fr. Nipal.
Sp. 4·5 inch. diam.: wood brown, nearly dull; rays distinct: bark flaky, not at all stringy.
22 Andromeda, fr. Nipal.
23 Andromeda, fr. Nipal.
Angaree. See Andromeda.
Anjoo. See Jasminum.
Annah-beng. See Fagræa.
Antheel. See Ludia.
24 Antidesma. Boro-helock, fr. Gualpara.
Grows in the mountains; 6 feet in girth; the wood used for furniture.—*Ham.*
25 Aquilaria agallochum. Aggur and Langchi, fr. Gualpara.
Attains a great size in the low-lands of Assam, and on the lower hills of Gualpara; but in these situations the wood is white, and in no estimation. In the Garo mountains certain parts of the heart of the wood become of a dark-brown colour, and are strongly impregnated with a highly scented oil. When in this state it is usually called Eagle-wood.—*Ham.*
26 Aralia digitata. Leesaong, N. fr. Nipal.
A rambling shrub.
27 Aralia nodosa, fr. Nipal.
Sp. small, imperfect, and worm-eaten.
28 Aralia, *v.* Panax, fr. Nipal.
Said to be excellent wood; used for boxes and other articles. Sp. 4·5 inch. diam.; light-coloured, rather soft.
Aroo. See Prunus.
29 Artocarpus. Thounben or Thoun-pine, B. fr. Tavoy.
A large tree; used in boat-building. It produces a sort of caout-chouc, with which the Burmese pay their boats.
30 Artocarpus, fr. Tavoy.
A large tree.
31 Artocarpus. Pynyathe or Tanabeng, B. fr. Tavoy.
Wood not used.
32 Artocarpus Chama. Kangtali chama, fr. Gualpara.
The glory of the forests of Gorakpur, where it attains a very great size: used for canoes, for which it is well fitted, being both very buoyant and durable in the water.—*Ham.*
33 Bah-nah-thoa (probably the same as Laurus Panatha of this Catalogue), fr. Tavoy.
Timber 4 to 6 fathoms long; 15 to 24 inches in diameter: used in boat and house-building.
Bajarmandi. See Fagraæa.
Bakhalpani. See Ficus.
Bakuri. See Bauhinia.
Bambusa. Bamboo, fr. Pulo-Geun, in Martaban.
The largest and tallest sort known; the stem 100 feet high, and attaining at the base a diameter of 11 inches, with sides 1 inch thick.
Banatha. See Laurus.
Bancha. See Ligustrum.
34 Bauhinia Tucra. Tukra, fr. Gualpara.
A close-grained, soft, tough wood, of a yellow colour.—*Ham.*
35 Bauhinia Bacuria. Bakuri, fr. Gualpara.
An open-grained, soft, tough wood; 3 cubits in girth: used for furniture.—*Ham.*

36 Bauhinia. Koila, P. fr. Nipal.
The flower-buds are eaten in curries.

37 Bauhinia, fr. Nipal.
A large tree.

38 Berberis pinnatifolia. Milkissee, N.; Jumne-munda, P.; fr. Nipal.
Rarely exceeding a foot in diameter.—Sp. 3 inch. diam.: wood strong, close, compact, yellow.

39 Berberis asiatica. Matekissee, N.; Chitra, P.; fr. Nipal.
Wood small.—Sp. rays rather large, distinct; layers 12 in 1·5 inch.: wood tough, compact, greenish yellow.

Bhela. See Anacardium.

40 Betula leptostachya, fr. Nipal.
Wood not to be distinguished from English birch.—Sp. 2·8 inch. diam.; 3 layers; rays in numerous, straight, narrow, parallel, ribands; bark thin, smooth, spotted like common alder.

41 Betula cylindrostachya, fr. Nipal.
Sp. 4·5 inch. diam.; wood shaky, of no value; layers not distinct enough to be counted; fibre white, glossy; rays dark nut-brown, in very distinct, narrow ribands; bark thick, tubercular.

42 Betula Bhojpattra, N. fr. Nipal.
Sp. 5·8 inch. diam.; about 20 layers; wood moderately hard and compact; cuticle used for writing on, and also for covering the inside of the tube of the hookah and kalioun.

Bhaleo. See Rhus.

43 Bheza Moya. Moj, fr. Gualpara.
A close-grained hard wood.—*Ham.*

Bhoea. See Conyza.

Bhoelasi. See Salix.

Bhongyena. See Decadia.

Bhosee. See Salix.

Bhojpattra. See Betula.

44 Bignonia Colais. Kolai Beng. Parijat, fr. Gualpara.
Often 5 cubits in girth; used only for fire-wood.—*Ham.*

45 Bignonia, fr. the higher parts of the Saluen river in Nipal.

46 Bignonia. Thathee, B. fr. Tavoy.
A very large tree.

47 Bignonia? Thuggainee, B. fr. Tavoy.
A large tree, used in house-building.

48 Bignonia. Lainbha, B. fr. Tavoy.
A middle-sized tree.

49 Bignonia chelonoides, fr. Nipal.
A large tree.

Billae. See Ligustrum.

Bireesee. See Myrsine.

50 Birouni, P. Kurauni, N. fr. Nipal.
Stem 6 to 8 inches in diameter.

Bojhinsi. See Coriaria.

Bonjam. See Gardenia.

Bonkapash. See Hibiscus.

Boro-belock. See Antidesma.

Borogotadhara. See Guarea.

Boropatiya. See Elæocarpus.

Bosuniyapoma. See Guarea.

51 Briedelia stipularis. Kohi, fr. Gualpara.
Grows to a large size; wood close, hard, tough; used for chests, stools, &c.—*Ham.*

52 Briedelia? fr. Nipal.
Wood not very hard, but fine-grained, and fit for ornamental cabinet-work. Sp. 2·5 inch, diam.; colour lighter than box; no tubes nor rays visible.

53 Brucea napalensis, fr. Nipal.

Bukkiamela. See Rhus.

54 Buddleia paniculata. Narum-pattee, P.; Sinna, N.; fr. Nipal.
Sp. 1·6 inch. diam.; rays very indistinct; wood pale brown, dull.

Bukaena. See Melia.

Bulsima. See Symplocos.

Bunamb. See Sphærocaria.

Bunaroo. See Quercus.

Bundhali. See Gardenia.

55 Butea frondosa. Polash, fr. Gualpara.
Sometimes 6 feet in girth; wood open, soft, and tough, but not strong; used in coarse furniture.—*Ham.*

56 Cæsalpinia? fr. Nipal.

57 Cæsalpinia Sappan. Sappan-wood.
A native both of the peninsula of India, of the Burmese country, and of the Malayan Islands. A large and valuable tree; the wood red; used in dying.

58 Calophyllum. Thurappe, B.; Choopee, N.; fr. Martaban.
A large tree, used for masts and spars, and for pestles for oil presses.

59 Calophyllum. Turra-phee, B. fr. Tavoy.
Very different from the preceding; used for masts and spars.

60 Callicarpa arborea. Khoja, fr. Gualpara.
6 feet in girth; used for mortars, pestles, and common furniture.—*Ham.*

61 Calyptranthes. Jam, fr. Gualpara.
8 feet in girth; made into planks, but not considered as of good quality—*Ham.*

62 Calyptranthes. Saljam, fr. Gualpara.
Seldom more than 3 cubits in girth. A close, hard, tough wood, used for posts, beams, and planks.—*Ham.*

63 Camellia Kissi. Kissi, fr. Nipal.
Wood close-grained; no sapwood.—Sp. 1·5 inch. diam.; wood pale brown; bark very thin.

64 Capparis, fr. Nipal.
Sp. 2 inch. diam.; wood white, moderately hard, dull.

65 Capparis, fr. Nipal.

66 Carapa. Taila-oon, B. fr. Tavoy.
Timber 13 to 15 cubits long, 15 to 18 inch. diam.; used in house-building.

67 Careya. Kaza, B. fr. Martaban and Tavoy.
Timber of large size; used for posts and other common purposes.

68 Careya. Kombo, fr. Gualpara.
About 3 cubits in girth; wood close, hard, tough, and strong. Stocks of matchlocks are made of it.—*Ham.*

69 Carpinus viminea. Chukisse, N.; Konikath, B.; fr. Nipal.
Wood esteemed by carpenters.—Sp. pale purplish, with little lustre, hard, rather heavy; tubes small.

70 Cassia Fistula. Sonalu, fr. Gualpara.
6 feet in girth; an open, hard, tough wood, used for ploughs.—*Ham.*

71 Cassia nodosa, fr. Bot. G*.
A very large tree.

* Bot. G., the Company's Botanic Garden at Calcutta.

72 Castanea tribuloides. Cotoor and Chisee; also Makoo Shingali, N. (Shingali, is the general name for oak and chestnut.) Fr. Nipal.

Used for large mortars and pestles for grinding grain in; becomes brown by steeping in water; wood hard and heavy.— Sp. rays like English oak; that is, every 5th or 6th much larger than the others. Another specimen, said to be of the same species, wants the large rays.

73 Castanea martabanica. Nome and Zitha, B. fr. Tavoy.

74 Castanea. Golsinggur, fr. Gualpara.

Branched prickles on the cup of the fruit; leaves entire; timber excellent, close, hard, and tough.—*Ham.*

75 Castanea. Nikari, fr. Gualpara.

Oak or chestnut; cup covered with strong prickles; leaves notched; 5 cubits in girth; timber close, hard, tough; used for furniture and canoes.—*Ham.*

76 Castanea. Kangta Singgur, fr. Gualpara.

Not exceeding 3 feet in girth; inferior in strength and toughness to the preceding.—*Ham.*

77 Cedrela hexandra. Toon-wood, fr. Nipal.

Sp. the wood has a great general resemblance to Laurus; the outer layers have white glossy fibres, with very distinct brown rays; the inner layers are brownish red, harder and more compact; bark with white fibres.

78 Cedrela Toona. Toon or Tungd; Poma; Jeea; fr. Gualpara.

5 cubits in girth; a close, hard, but rather brittle wood, of a brown red colour; very durable, and esteemed for furniture. It has an agreeable smell. —*Ham.* The wood, under the name of Toon, is extensively used among the Europeans in Portugal for chairs and other furniture.

79 Celastrus, fr. Nipal.

An enormous climber.—Sp. trunk deeply channelled externally; wood light, reddish brown; tubes large and numerous; rays deep and very distinct, but of the same colour as the rest of the wood; bark, outer, orange yellow; inner, deep brown.

80 Celastrus verticillata, fr. Nipal.

A small tree.

81 Celastrus ? fr. Nipal.

Sp. 1·8 inch diam.; wood rather soft, very fine-grained; tubes and rays very indistinct; inner bark nearly black; approaches in most of its characters to Turpinia.

82 Celtis australis, fr. Bot. G.

83 Celtis. Khori, P.; Koosikma, N.; fr. Nipal.

84 Cerasus. Puddom. Nipal cherry, fr. Nipal.

Sp. 3·5 inch. diam. 14 layers: rays reddish brown, distinct; wood rather soft, with some lustre.

85 Cerbera Manghas. Kullooa, B. fr. Tavoy.

From the fruit (probably the kernels) an oil is drawn with which the Burmese anoint their hair. Wood not used.

Chacrosila. See Elæocarpus.

Chalita. See Dillenia.

86 Chamærops Martiona, *Wall.* Nipal palm, fr. Nipal.

87 Champa, white, fr. Nipal.

Sp. part of a plank: a free-working wood, soft and light like deal: fibre wavy, white, and very glossy: rays shallow and slender: layers very distinct, 32 in 4·5 inches. Compare Michelia.

Chabsee. See Michelia.

Chasehoo. See Laurus.

Chatiyan. See Alstonia.

Cheriala. See Rhododendron.

Cherouni. See Acer.
Chickooni. See Eurya.
Chillounea. See Gordonia.
Chitra. See Berberis.
Choopee. See Calophyllum.
Choo-kha. See Pongamia.
Choo-mulloo. See Diospyros.
Choo-muna. See Xanthoxylon.
Choopee. See Calophyllum.

88 Choorosi, N. fr. Nipal.
A very fine sort of wood, said to come from the north. I only knew it from having a walking-stick of it, which was presented to me by the Vice-regent of Nipal.
Chose. See Rhus.

89 Chaulmoogra odorata, *Roxb.* fr. Bot. G.
A very large tree.

90 Chotagotadhora, *Bengal*, fr. Gualpara.
Chukisse. See Carpinus.
Chusee. See Elæagnus.

91 Chrysophyllum acuminatum, *Roxb.* Pithogarkh, fr. Gualpara.
3 cubits in girth; wood white, tough, used in furniture.—*Ham.*

92 Chung, fr. Gualpara.
Perhaps a species of Chilmoria. It grows very large, and affords a close tough wood used in furniture.—*Ham.*

93 Cinchona gratissima, *Wall.* Tungnusi, N. and P. fr. Nipal.
A native also of the mountains in Bengal, where it is called Usokuli: used in Nipal for posts and rafters.—Sp. wood brown, light, coarse-grained: bark with many compressed coarse fibres.

94 Clerodendron phlomoides. fr. Bot. G.

95 Coccoloba uvifera, fr. Bot. G.

96 Conyza candicans, *Wall.* Phusrae, P.; Bhoea, N.; fr. Nipal.

97 Cordia Myxa? fr. Nipal.
A large tree.

98 Coriaria nepalensis. Bhojhinsi, N. fr. Nipal.
The fruit is eaten: trunk 4 or 5 inches in diam. Wood not used.

99 Cornus oblonga, *Wall.* Easee, N. and P. fr. Nipal.
A tree of middle size.—Sp. 3 inch. diam. Wood fine-grained, rather hard; fibre white and shining: rays very numerous, reddish brown.

100 Cornus Capitata, *Roxb.* fr. Nipal.
Grows sometimes to a great size. Wood very hard.

101 Corylus ferox, *Wall.* fr. Nipal.
Grows at the top of Sheopore, one of the highest mountains in Nipal; flowers in September, and produces fruit in December: shell of the nut hard and thick. A tree 20 feet high, 2 feet in girth; wood light, compact.

102 Cotoneaster affinis, *Lindl.* fr. Nipal.

103 Cotoneaster obovata, *Wall.* fr. Nipal.
Catoor. See Castanea.

104 Cou-moo, fr. Tavoy.
Timber 5 to 10 fathoms long; 20 to 30 inches in girth; used in boat and house-building; not much inferior to Hopæa.

105 Cratægus arbutiflora. Rooes, N. fr. Nipal.
A small tree, or rather shrub; wood exceedingly strong: used for walking-sticks.

106 Croton oblongifolium, *Roxb.* Parokupi, fr. Gualpara.
5 cubits in girth ; a close-grained but rather brittle wood ; used for coarse furniture.—*Ham.*

107 Croton. Lalpatuja, fr. Gualpara.
3 cubits in girth ; a hard close-grained wood, used for small canoes.

Cusroo. See Quercus.

108 Cyathea spinulosa. Fern-tree, fr. Nipal.

109 Cynometra. Maingga, B. fr. Martaban.
A small tree.

Daine-oksi. See Dillenia.

110 Dalbergia Momsita, *Ham.* Momsita, fr. Gualpara.
Attains a considerable size : wood close, hard, and tough ; used in coarse furniture.—*Ham.*

111 Dalbergia (Rangoon Sissoo), fr. Rangoon, *Ham.*

112 Dalbergia, fr. Nipal.

113 Daphne Gardneri, *Wall.* fr. Nipal.
Wood not used. Bark used for paper stuff.—Sp. 3·75 inch. diam. ; wood light, soft, coarse, of a grey colour, with little lustre ; bark finely fibrous.

114 Daphne cannabina. Loureir, fr. Nipal.
A shrub, from 6 to 8 feet high ; grows on the most exposed parts of the snowy mountains of Nipal. Paper made of the bark is strong, tough, not liable to crack, nor to be eaten by the white ant or other insects.

115 Decadia spicata. Bongyera, fr. Gualpara.
3 cubits in girth. A close, hard, tough wood, used by carpenters.—*Ham.*

Deodae. See Ficus.

Dheyri. See Taxus.

Dhoree. See Gualtheria.

116 Dillenia. Zimboon, B. fr. Tavoy.
Timber 3 to 5 fathoms long, 8 to 10 inches diameter. Wood used in house-building ; it also affords small crooked timbers for boats.

117 Dillenia pilosa, *Roxb.* Daine-oksi, fr. Gualpara.
Trunk 6 feet in girth. Wood open, but hard and tough ; used for canoes. —*Ham.*

118 Dillenia Pentagyna. Oksi, fr. Gualpara.
Wood closer, but in other respects very like the preceding.—*Ham.*

119 Dillenia speciosa. Chalita, fr. Gualpara.
6 feet in girth. Wood close and hard, but rather brittle.

120 Diospyros. Tendoo, N. fr. Nipal.

121 Diospyros ? Ryamucha, B.; Choomulloo, T.; fr. Martaban.
Wood used in house-building.

122 Dipterocarpus grandiflora, *Wall.* Ain or Aintha, B. fr. Martaban, on the banks of the Atran ; also from Tavoy.
A stupendous tree : one of those which yield wood-oil and dammar.

123 Dipterocarpus. Kunnean-phew, B. fr. Tavoy.
5 to 8 fathoms long ; 18 to 24 inches in diameter ; grows to a great size ; used for beams and planks.

Doduan. See Smilax.

124 Dubdubia. (See Rhus.) fr. Nipal.
Sp. 4·2 inch. diam. ; layers 10 ; rays distinct ; tubes few, rather large. Wood very white, light, and soft. Bark thin.

Dudkuri. See Alstonia.

Eandorkomul-soong. See Gardenia.

Earansa. See Eurya.

Easee. See Cornus and Rubus.

Eea. See Loranthus.

125 Ehretia serrata, *Roxb.* Nalshima, N. fr. Nipal; also fr. Gualpara.
5 cubits in girth; gives planks from 12 to 18 inches wide; wood soft and open-grained, but rather tough; not durable; used for posts and other common purposes.

126 Ehretia serrata, or macrophylla. Poegulsee, N. fr. Nipal.
Sp. 3 inch. diam.; layers 10; tubes few and small; rays distinct; wood white, moderately shining, soft.

127 Ehretia lævis, fr. Bot. G.

128 Ekebergia. Jiyakohi, fr. Gualpara.
5 cubits in girth; wood like mahogany, very durable, and much esteemed.

129 Elæagnus, fr. Nipal.
Wood similar to, but whiter than, common hawthorn.—Sp. 4 inch. diam.; layers 27 in 1·7 inch: neither tubes nor rays visible in the cross section: bark thin.

130 Elæagnus. Chusee, N. fr. Nipal.

131 Elæocarpus. Boropatiya, fr. Gualpara.
A close hard wood, of good size, used for canoes.—*Ham.*

132 Elæocarpus Chacrosila, *Ham.* fr. Gualpara.
A close hard wood, used for mortars, chests, &c.—*Ham.*

133 Elæocarpus. Thaumagee, T. fr. Martaban.
Timber very large, used for masts and posts for houses.

134 Embelia, fr. Nipal.
Sp. very imperfect.

135 Eriobotyria elliptica. Mihul, P. and N. fr. Nipal.
Wood cinnamon-brown, hard, compact, and reckoned good.—Sp. 7 inch. diam.; rings indistinct, about 26 in 3·1 inches; tubes very small.

Esealoo. See Rubus.

136 Euonymus. Veysoor, N.; Junghuree, P.; fr. Nipal.
Grows large; wood close-grained, not very hard, perhaps good for carvers.—Sp. rays and tubes scarcely visible: outer bark yellowish gray.

137 Euonymus tingens. Kusoori, N. fr. Nipal.
Wood brown, compact, hard, very fine-grained, dull.—Sp. tubes not visible; rays small and indistinct: bark, outer, orange yellow; inner, brown with fine white fibres: the yellow bark is used for painting the forehead.

138 Euonymus echinata, *Wall.* fr. Nipal.

139 Euonymus pendula (japonica, *Thunb.*), fr. Nipal.
Sp. wood brown, moderately hard, fine-grained dull; tubes and rays as E. tingens: outer bark yellowish in places; inner, brown.

140 Euonymus, fr. Nipal.
Tall, but of a slender stem.

141 Euphorbiacea. Yamala, B. fr. Tavoy.
Wood used for frames of lacquered ware.

142 Eurya nepalensis. Jeegnee, P.; Earansea, N.; fr. Nipal.
A small tree.—Sp. 5 inch. diam.

143 Eurya variabilis (probably the same as the preceding). Chickouni, B. and N. fr. Nipal.
Grows large; wood compact, fine-grained, cinnamon-brown; good for turnery ware.

144 Eurya? fr. Nipal.
Sp. 2·5 inch. diam.: tubes small; rays distinct, red brown; fibre pale brown, with moderate lustre: wood reddish brown, fine-grained, moderately hard.

145 Eurya. Thaun, B. fr. Tavoy.
A small tree, used only for fuel.

146 Excœcaria ? Thurrotha, B. fr. Tavoy.

147 Fagara floribunda, fr. Nipal.

Sp. 2·2 inch. diam.: tubes many and large: wood coarse, and of remarkably open grain, but more compact near the axis; colour brownish yellow, nearly dull.

148 Fagara, fr. Nipal.

149 Fagara Rhetza, *Roxb.* Bajarmondi, fr. Gualpara.

Wood close, hard, tough; fit for the joiner.—*Ham.*

150 Fagræa fragrans, *Roxb.* Annah-beng, B. fr. Martaban.

Timber not large; wood yellowish, compact, and beautiful, but very hard, and on this account not much used by the Burmese.

151 Ficus. Doodae-kath, N. P. fr. Nipal.

Ueed for water-courses, drains, and gutters.—Sp. 4·5 inch. diam.; layers 63 in 2 inches; wood soft, free-working, closer than deal; lustre considerable, satiny.

152 Ficus ? Kaffræa, P.; Pillaksi, N.; fr. Nipal.

Sp. 1·75 inch. diam.; layers about 59; rays brown, indistinct: wood soft, light, of no use.

153 Ficus, fr. Nipal.

Small specimen; rays distinct; wood soft, light.

154 Ficus, fr. Nipal.

A climber.

155 Ficus, fr. Nipal.

A climber.—Sp. rays nut-brown, strongly marked; wood light, not very soft, pale brown, with some lustre.

156 Ficus, fr. Nipal.

Sp. 4 inch. diam.; rays brown, very distinct; layers very many; wood moderately hard, with some lustre.

157 Ficus, fr. Nipal.

Sp. 2·4 inch. diam.; rays brown, strongly marked; layers very indistinct; tubes large, giving the wood a coarse grain: wood reddish brown, rather hard.

158 Ficus, fr. Nipal.

A large tree.—Sp. 4·5 inch. diam.; layers very numerous; wood soft, worm-eaten.

159 Ficus. Thubboo, B. fr. Tavoy.

A middle-sized tree; wood used in house-carpentry.

160 Ficus. Thuppan, B. fr. Tavoy.

A large tree; wood not used.

161 Ficus undulata. Bakhalpani, fr. Gualpara.

6 cubits in girth; makes good canoes: wood open, soft, rather tough.—*Ham.*

162 Ficus oppositifolia. Khoskadumer, fr. Gualpara.

3 cubits in girth; wood open, soft, brittle.

163 Fraxinus floribunda. Lakkuree, N. fr. Nipal.

Sp. 17 layers in 2·1 inches; in colour, grain, and toughness, just like English ash.

164 Freziera ochnoides, fr. Nipal.

A middle-sized tree; wood pale brown, close-grained, and moderately hard.—Sp. 2·5 inch. diam.; rays hardly distinguishable; resembles pear-tree.

Gambhari. See Gmelina.

165 Garcinia. Pullowa, B. fr. Tavoy.

A large tree, used for posts, &c.

166 Garcinia paniculata, fr. Bot. G.

167 Gardenia florida. Eandorkomul-soang, N. fr. Nipal.

168 Gardenia, fr. Nipal.
Sp. wood cream-brown, fine-grained, hard, compact; probably useful for turnery ware.

169 Gardenia. Bonjam, fr. Gualpara.
3 cubits in girth; well adapted for all kinds of turnery ware.—*Ham.*

170 Gardenia. Bundhali, P. and N. fr. Nipal.

171 Gardenia latifolia, fr. Bot. G.

172 Gardenia lucida, fr. Bot. G.

173 Gastonia palmata, fr. Nipal.

Ghese. See Quercus.

Ghonas. See Rhododendron.

Ghorans. See Rhododendron.

Gillaephul. See Spondias.

174 Gmelina arborea. Gambhari, fr. Gualpara.
Wood light, but durable, does not warp, and is not readily attacked by insects; used for turnery ware of all kinds, and cylinders of a proper size are turned very thin for drums: other musical instruments are also made of it.

Goechassee. See Gordonia.

Golsinggur. See Castanea.

Gomulsee. See Quercus.

Gooki. See Symplocos.

Goonsi. See Podocarpus.

Goopor. See Pyrus.

175 Gordonia integrifolia. Chillounea, P.; Goechassee, N.; fr. Nipal.
The bark contains white spiculæ, that produce violent itching when rubbed on the skin in their recent state. The Burmese have a superstition, that one beam in a house should be made of this wood. Wood brown, nearly dull, moderately hard and compact.

176 Gordonia? Kaza, B. fr. Martaban.
Large timber, used for ordinary building purposes.

Govorpongyata. See Guarea.

177 Grewia. Meaya, B. fr. Tavoy.

178 Gualtheria fragrantissima. Dhoree, N.; Dhoseongree, P.; fr. Nipal.

179 Guarea, fr. Nipal.
Sp. 3·5 inch. diam.; wood moderately hard, compact, pale reddish brown.

180 Guarea. Amari, fr. Gualpara.
5 cubits in girth; wood close, hard, and tough; used for canoes.—*Ham.*

181 Guarea Gobara. Govorpongyata, fr. Gualpara.
Used for canoes.—*Ham.*

182 Guarea Alliaria. Bosuniyapoma, fr. Gualpara,
Used for canoes.—*Ham.*

183 Guarea Gotadhara. Borogotadara, fr. Gualpara.
5 feet in girth; wood close and hard; used by joiners.—*Ham.*

Guarnasi. See Rhus.

Hakoolual. See Limonia.

Harobaer. See Ziziphus.

184 Heritiera Fomes, *Ham.* (minor, *Roxb.)* Kunnazoo, B. fr. Tavoy, Soondree of Bengal.
A very large tree; wood exceedingly hard and durable; used for pestles for oil-mills; shafts of gigs, spokes, and naves, are made of it: an excellent fuel for burning bricks; grows to a much greater size on the Martaban coast than in Bengal.

185 Hibiscus macrophyllus, *Roxb.* fr. Tavoy.
A middle-sized tree, used for common building purposes, bark tough and stringy; is made into cordage.

186 Hibiscus (perhaps a Sterculia), fr. Tavoy.
Applied to the same uses as the foregoing.

187 Hibiscus Lampas. Bonkapash, fr. Gualpara.
6 feet in girth; a soft, open wood, used for coarse furniture.—*Ham.*

188 Holboellia (Stauntonia) latifolia. Bagul, T. fr. Nipal.
A vast climber.

189 Hopea odorata. Tengaun or Thaengong. Common on the Tenasserim and Martaban coasts.
Canoes are made of this tree, which grows to an enormous size: it also produces a valuable resin or dammar.

190 Hopea floribunda, *Wall.* Tantheya, fr. Tavoy.
A very large tree.

191 Hovenia dulcis, fr. Nipal.
A very large tree.—Sp. 3 inch. diam.; layers 9; wood light, coarse-grained.

192 Hydrangea altissima, fr. Nipal.
A climber.

193 Hydrangea trigyna, *Wall.* fr. Nipal.

194 Hymenodictyon flaccidum, *Roxb.* fr. Nipal.
Sp. 1·125 inch. diam.; wood dirty grey, nearly dull; moderately hard.

195 Ilex dipyrena, *Wall.* Karaput, P.; Munasi and Gulsima, N.; fr. Nipal.
Wood heavy, hard, fine-grained, and much like common holly, said to become black with age; used for various purposes of carpentry.—Sp. 3 inch. diam.; tubes very small; rays distinct.

196 Jambolifera pedunculata. Hulhholi, fr. Gualpara.
3 cubits in girth; used for stocks of matchlocks.—*Ham.*

197 Jasminum arboreum. Anjoo, N. from Nipal.
Sp. 4 inch. diam.; wood pale brown, nearly dull, fine-grained, hard, compact.

198 Jasminum dispermum, fr. Nipal.

199 Jasminum chrysanthum. *Roxb.* fr. Nipal.
Sp. 1·8 inch. diam.; neither tubes nor rays visible; wood white, fine-grained, moderately hard; brittle, bard concretions in the bark.

Jeea. See Cedrela.

Jeegue. See Eurya.

Jhoori. See Osyris.

Jiyakoki. See Ekebergia.

Joolchumahl. See Acacia.

200 Joolshima, N. fr. Nipal.

Juggoochal. See Andromeda.

201 Juglans pterococca, *Roxb.* from Nipal.
An exceeding large tree.—Sp. 3·5 inch. diam.; wood pale reddish brown, with considerable lustre, but rather coarse-grained.

Julsi. See Rondeletia.

Jumnemandoo. See Berberis.

Junghurree. See Euonymus.

202 Juniperus excelsa, Bieb? The Cedar of Himalaya.
Harder and less odorant than the West Indian cedar; an excellent light wood.

203 Justicia Adhatoda. Kath, P.; Alesi, N.; fr. Nipal.

204 Kaantha, B. fr. Tavoy.
3 to 5 fathoms long, 12 to 15 inches in diameter. Yields a small but valuable timber for oars and paddles.
Kadabusi. See Ziziphus.
Kaffræa. See Ficus.
Kaintha-phogee. See Symplocos.
Kaizai. See Laurus.
205 Kalajiya, fr. Gualpara.
Common over all India; remarkable for the facility with which it grows from cuttings, and from truncheons; yields much gum; wood of no use.—*Ham.*
Kalikat. See Limonia.
Kalikath. See Symplocos.
Kalikaut. See Myrsine.
Kanaput. See Ilex.
Kangtali-chama. See Artocarpus.
Kangta-singgur. See Castanea.
Kath. See Justicia.
206 Kaunzo-Kurro, B. fr. Tavoy.
5 to 7 fath. long, 15 to 20 inch. diam.; used in boat-building. *See also* Meliacea.
Kayzai. See Laurus.
Kaza. See Careya and Gordonia.
207 Keahnaun, B. fr. Tavoy.
15 to 20 feet long, 15 to 20 inch. diam.; strong crooked timber, used for musket-stocks. *See also* Xylocarpus.
Keannan. See Xylocarpus.
Kee-tha. See Syndesmis.
Keounlak. See Rottlera.
Keysoor. See Euonymus.
Kheemna. See Laurus.
208 Kheera, N. fr. Nipal.
An Euphorbiaceous tree, of no value.
Khori. See Celtis.
Khoskadumor. See Ficus.
Koila. See Bauhinia.
Kohi. See Briedelia.
Kolai. See Bignonia.
Kombo. See Careya.
Komkath. See Carpinus.
Kongeea. See Rondeletia.
Korui. See Acacia.
Kooathoe. See Myristica.
Koosikma. See Celtis.
209 Kuddoot-Alain, B. fr. Tavoy.
Grows to a great size; used by house and boat-builders.
210 Kuddoot-nee, B. fr. Tavoy.
6 to 8 fath. long, 15 to 20 inch. diam.; an inferior wood, used in boat-building.
Kuenmoonee. See Lagerstroemia.
211 Kujulsee, P. and N. fr. Nipal.
Trunk 2 feet in diam.; wood strong and durable; used for door-posts.

Kullooa. See Cerbera.
Kullowa. See Laurus.
212 Kummi, B. fr. Tavoy.
Kunna. See Pierardia.
Kunnazoo. See Heritiera.
Kunnean-phew. See Dipterocarpus.
Kunneen. See Myristica.
Kunneen-keunke. } See Symplocos.
Kunneen-keunla. }
Kunneenee. See Sterculia.
Kurauni. See Birouni.
Kurrowa. See Laurus.
Kusoori. See Euonymus.
Kuzzo. See Pierardia.
Kyakle. See Quercus.
Kyamucha. See Diospyros.
Labtesee. See Panax and Rottlera.
213 Lagerstroemia. Kuenmounee or Peema, B. fr. Tavoy.
Used in house-building, and for oars.
214 Lagerstroemia parviflora, *Roxb.* Sidą, fr. Gualpara.
A large tree, 6 feet in girth, and very common; wood close, hard, and tough, forming excellent timber.—*Ham.*
215 Lagerstroemia Reginæ. Jarul, fr. Gualpara.
6 feet in girth, used in boat-building; but the wood is soft, and deficient in toughness.—*Ham.* It is extensively used in Bengal under the name of Jarul.—*Wall.*
Lakhurree. See Fraxinus.
Lalpatuja. See Croton.
Lambha. See Bignonia.
Langchi. See Aquilaria.
Latasishnoo. See Urtica.
216 Laurina. Tapahaw, N. fr. Nipal.
217 Laurus. Lumpatch, P.; Chasepoo, N.; fr. Nipal.
4 to 6 feet in diam.; wood soft and pale when young, hard and pale red when older; used in carpenter's work, and for beams.—Sp. 27 layers in 1·8 inches; lustre considerable; rays mostly distinct.
218 Laurus glandulifera. Sassafras and Camphor-wood of Nipal, fr. Nipal.
Sp. fibre pale flesh colour, with considerable lustre; rays small, dark red-brown; wood soft, coarse.
219 Laurus. Very like the preceding. Kullowa or Kurrowa, B. fr. Tavoy.
Produces the sassafras-bark and camphor-wood of Martaban.
220 Laurus caudata, fr. Nipal.
Sp. fibre light-coloured, shining; tubes not numerous but large; rays distinct, dark brown; 4·2 inch. diam.; layers 12; axis very eccentric.
221 Laurus albiflora, fr. Nipal.
A large tree.—Sp. 3·8 inch. diam.; fibre, tubes, and rays, as the foregoing.
222 Laurus. Panatha (Banatha ?), B. fr. Tavoy.
Used in house carpentry.

223 Laurus. Maythen, B. fr. Tavoy.
5 to 6 fath. long, 18 to 26 inch. diam.; a very large tree; wood used for furniture, in house carpentry, and for planks and upper decks for proas.

224 Laurus. Pahela, N. fr. Nipal.

225 Laurus? Kheemna, B. fr. Tavoy.
Timber small; used for posts and rafters.

226 Laurus. Phetpetta, N.; Balukshee, P.; fr. Nipal.
Wood red-brown, of a fine grain, used for chests, &c.—Sp. fibre and rays as other Lauri; tubes filled with a dark red-brown substance.

227 Laurus. Chausoma, N. fr. Nipal.
Sp. fibre light-coloured, with considerable lustre; tubes rather large; rays distinct, dark-brown.

228 Laurus. Sami-lumpata, P.; Chikihul-tussipoo, N.; fr. Nipal.
Sp. fibre cream-colour, shining; tubes and rays cinnamon-brown; rather fine grain.

229 Laurus. Keebula, N.; Kalechampoo, P.; fr. Nipal.
Sp. 3·2 inch. diam.; fibre, tubes, and rays, as other Lauri.

230 Laurus. Pumlasi, N.; Khorkula, P.; fr. Nipal.
A large tree; wood strong and durable.—Sp. 1·6 inch. diam.

231 Laurus. Khulsi, N. fr. Nipal.

232 Laurus (or Tetranthera), very like T. pulcherrima. Bulooksee, N.; Sengoulee and Tijpaut, P.; fr. Nipal.
Wood excellent, used for spinning wheels.—Sp. 3·5 inch. diam.; fibre, tubes, and rays, as other Lauri.

233 Laurus. Phusree, N. and P. fr. Nipal.
Wood grayish brown.

234 Laurus lanuginosa, *Wall.* fr. Nipal.
Sp. wood cream-brown; moderately hard; rays, tubes, and fibre, as others.

235 Laurus. Thuggoo, B. fr. Tavoy.
4 to 6 fath. long, 12 to 18 inch. diam.; used for oars and rudders.

236 Laurus, (Tetranthera bifaria, *Wall.*) Juttrunga, N.; Pahelakath, P.; fr. Nipal.
Large and useful timber; wood soft, rather spongy.—Sp. 6 inch. diam.; rotten at heart; fibre pale yellow, glossy; rays distinct, dirty brown.

237 Laurus? Thitya, B. fr. Tavoy.
A very large tree; wood used for house-building, and for mortars in which rice is husked.

238 Laurus. Kayzai, B. fr. Tavoy.
Wood used in house carpentry.

239 Laurus salicifolia. Horisongher, fr. Gualpara.
6 feet in girth; wood has a strong smell of camphor; used for coarse articles of furniture.—*Ham.*

240 Laurus Champa. Kurka-champa, fr. Gualpara.
3 cubits in girth; used for coarse furniture.—*Ham.*

241 Leucosceptrum, fr. Nipal.
Wood used for rafters; soft and of no value.—Sp. fibre with some lustre; rays moderately distinct; axis very eccentric.

242 Leycesteria formosa, *Wall.* fr. Nipal.

243 Ligustrum napalense. Billae or Bancha, N. and P. fr. Nipal.
Timber about a foot or more in diameter; used for building purposes.—Sp. 4 inch. diam.; layers about 10 in an inch: wood heavy, hard, compact, tough, and very fine-grained; for the purposes of the engraver will probably be found nearly as good as Mediterranean box; bark with coarse white fibres.

244 Limonia. Kailkat, P.; Hakoolnal, N.; fr. Nipal.
Timber large for the genus; wood white, soft, but close, strong, and tough; fit for fine turnery ware.—Sp. 7 inch. diam.; neither rays nor tubes visible; inner bark very fibrous.
245 Limonia crenulata, fr. Nipal.
Wood yellow, very hard; used in house-building.
Lissokatta. See Loranthus.
Lolsi. See Taxus.
246 Loranthus. Eea, N.; Lissokatta, P.; fr. Nipal.
Loshima. See Viburnum.
247 Ludia. Mulloka, N.; Antheel; fr. Nipal.
Used for posts and walking-sticks.
248 Ludia spinosa, fr. Bot. G.
Lumpatch. See Laurus.
Lushpoo. See Sphærocaria.
Luzun. See Pongamia.
249 Magnolia insignis, *Wall.* fr. Nipal.
Sp. 3 inch. diam.; 12 layers; wood rather soft, moderately fine-grained, and with some lustre.
250 Mainaban, B. fr. Tavoy.
Resembles lance-wood; used for beams, posts, and rafters; also for lances, bows, sword-handles, &c.
Maingga. See Cynometra.
Magor. See Vernonia.
Mako-shingali. See Castanea.
Makusal. See Gordonia.
251 Malpighia lucida, fr. Bot. G. A native of America.
Masoochi. See Laurus.
252 May-chin-chan-jay. Probably a species of Ebenus.
253 May-klen, fr. Tavoy.
Scarce and dear; used for rudders and anchors.
254 May-maka, fr.
Used for timbers of junks.
255 May-rang, fr. Tavoy.
Said to be very durable, and much esteemed for the posts of houses built on the bank of rivers.
256 May-tobek, fr. Tavoy.
Imported in long planks, and used in preference to teak for the bottom planks of ships.
Mathen. See Laurus.
Meaya. See Grewia.
257 Meenaban, fr. Martaban.
5 to 8 cubits long, 6 to 10 inch. diam.; a durable and pliant wood, used for sword-handles and spear-shafts.
258 Megeongee, fr. Tavoy.
A very large tree, used in house-building.
Mehul. See Pyrus.
259 Melia. Bukaena, P.; Baksi, N.; fr. Nipal.
260 Meliacea? Kanzo-Kurroo, B. fr. Nipal.
261 Meliacea. Tokor, fr. Gualpara.
A large tree, used for planks, canoes, and coarse furniture.—*Ham.*
262 Menispermum laurifolium, *Roxb.* fr. Nipal.
A large tree, very remarkable for the grain and irregular layers of its wood.

Mhasoosee. See Spondias.

263 Michelia Kisopa, *De Cand.* Champ or Chaump, P.; Chobsse, N.

The wood much used for light works.—Sp. piece of a plank, 30 layers in 3·75 inches; another Sp. 2·5 inch. diam. 12 layers in 1·1 inch. Similar to white Champa, No. 87, but the colour is more yellow, and the rays less distinct.

Mihul. See Eriobotrya.

Mikay. See Murraya.

Milkissee. See Berberis.

264 Millingtonia pungens, fr. Nipal.

A middle-sized tree.

265 Mimosa capensis, Bot. G.

266 Mimosa odoratissima, Bot. G.

267 Mimosa polystachya, Bot. G.

268 Minusops. Thubbae, B. fr. Tavoy.

Wood used for masts and spars; affords also good crooked wood.

269 Minusops Elengi, fr. Tavoy.

Slow-growing; reared only on account of its flowers, which smell like Russia leather.

270 Mimusops? Chalpata, fr. Gualpara.

A tree of moderate size, used for coarse furniture.—*Ham.*

Moj. See Bheze.

Momsita. See Dalbergia.

271 Morinda citrifolia, Bot. G.

The root yields a yellow dye.

272 Morus lævigata, *Wall.* fr. Nipal.

A large tree.—Sp. 1·5 inch, diam.; wood coarse brownish yellow, with considerable lustre.

273 Morus mauritiana, fr. Bot. G.

Motikissee. See Berberis.

Moyen. See Vauqueria.

274 Mucuna, fr. Nipal.

A superb climber (a kind of cowhage).

Mullokath. See Ludia.

Munasi. See Ilex.

Munachoo. See Rottlera.

275 Murraya. Maikay, B. fr. Tavoy.

4 to 5 feet long, 3 to 6 inch. diam.; used for handles of daggers and of other weapons. A strong, tough wood, in grain like box.

276 Myginda. Silapoma, fr. Gualpara.

5 cubits in girth; used for coarse furniture.—*Ham.*

277 Myrica sapida, *Wall.*; Kaephul, P.; Kobusi, N.; fr. Nipal.

Grain like birch, but the colour darker.—Sp. 2·5 inch. diam.; fibre brownish white, nearly dull; rays very distinct, dark brown in the outer layers; the interior layers harder, heavier, and more compact. The fruit is eaten.

278 Myristica? Thounsanga, B. fr. Tavoy.

A large tree; the wood used in boat-building.

279 Myristica. Koathoe or Kunneen, B. fr. Tavoy.

A large tree; the wood used for flooring houses: perhaps the same as the foregoing.

280 Myristica. Jheruya, fr. Gualpara.

A sort of nutmeg, but neither the nut nor mace have any aroma: timber 5 cubits in girth, used for furniture.—*Ham.*

281 Myrsine capitellata, fr. Nipal.
Wood compact, hard, with a handsome grain.—Sp. 3·5 inch. diam.; fibre cream-colour; rays very distinct, broad, heavy, pale brown.

282 Myrsine semiserrata. Bireesee and Kalikaut, N. and P. fr. Nipal.
Wood excellent.—Sp. 2·5 inch. diam.; rays large, deep flesh-colour, and very ornamental.

283 Nauclea Cadamba, *Roxb.* Kodom, fr. Gualpara.
A noble tree, 6 feet in girth; wood yellow, used for coarse furniture.—*Ham.*

284 Nauclea undulata, fr. Bot. G.

Nalshima. See Ehretia.

285 Nerium tomentosum. Adhkuri, fr. Gualpara.
3 cubits in girth; used for furniture.—*Ham.*

286 Nerium antidysentericum. Dudkhuri, fr. Gualpara.
Of the same size and uses as the foregoing: beads are also made of it.—*Ham.*

287 Nikari, fr. Gualpara.
An oak or chesnut; cup covered with large prickles; leaves notched; 5 cubits in girth; used for canoes and furniture.—*Ham.*

Niyor. See Schinus.

Nome. See Castanea.

Novum-pattee. See Buddleia.

Odla. See Sterculia.

Okchi. See Dillenia.

288 Olea glandulifera, fr. Nipal.
A large tree.—Sp. 5 inch. diam.; rays very thin and indistinct; wood pale brown, very hard, heavy, and compact.

289 Oleina, fr. Nipal.
A middle-sized tree.—Sp. 3 inch. diam.; wood pale brown, with considerable lustre, handsome grain, and very hard.

Oosihu. See Podalyria.

290 Ormosia glauca.
Sp. 3·5 inch. diam.; wood light brownish yellow, with some lustre, hard, and coarse-grained.

291 Osyris napalensis. Ihoori, P. and N. fr. Nipal.
A large timber tree, the fruit of which is eaten, and the wood is in estimation.—Sp. 1·5 inch. diam.; tubes very small; wood red-brown, rather hard, compact, and very fine-grained.

292 Osyris peltata. Phaoun, B. fr. Tavoy.

Pahela. See Laurus.

Paingodoo. See Acacia.

Palash. See Butea.

Paluepean. See Sapota.

Panatha. See Laurus.

293 Panax polyacanthus, fr. Nipal.
A large tree.

294 Panax. Lubtesee, N. fr. Nipal.
Sp. about 2·5 inch. diam.; wood soft, light, spongy, with high lustre; bark with short thick tubercles or spines, broad at the base.

295 Panax? fr. Nipal.
Sp. 4 inch. diam.; wood soft, light, spongy, nearly dull; rays numerous, and very distinct in the outer layers.

296 Panax, fr. Nipal.

297 Panax pendulus, fr. Nipal.
A middle-sized tree; wood pale reddish brown, light, moderately hard; rays distinct, giving a handsome grain.
Pangeh-petiya. See Tetranthera.
Panmuja. See Tetranthera.
Parijat. See Bignonia.
Paro-kupi. See Croton.
Passy. See Pyrus.
Paunlah. See Symplocos.
Peema. See Lagerstroemia.
298 Penlay-peen, fr. Tavoy.
5 to 6 fathoms long; 8 to 15 inches diameter; used in house-building.
Phaoun. See Osyris.
299 Photinia dubia, *Lindl.* fr. Nipal.
Grows about 20 feet high; wood hard, fine-grained.
300 Photinia integrifolia, fr. Nipal.
Sp. 2·1 inch. diam.: works freely; somewhat coarse; colour reddish brown, with scarcely any lustre.
Phrarat. See Quercus.
Phurasee. See Turpinia.
Phusrae. See Conyza.
Phutki. See Eurya.
301 Phyllanthus Emblica, fr. Nipal.
Sp. 3 inch. diam.; layers about 8, very indistinct; rays distinct: a handsome, nut-brown, glossy, hard wood.
302 Phyllanthus? Horinhara, fr. Gualpara.
A tree of moderate size; the wood used for coarse furniture.—*Ham.*
303 Pienmahne, fr. Tavoy.
4 to 6 fathoms long; 18 to 20 inches diameter; affords the best and strongest crooked timber, and is very durable; used also in house-building.
304 Pienmah-pue, fr. Tavoy.
See Lagerstroemia.
305 Pierardia? Kunna or Kuzzo, B. fr. Tavoy.
Pillaksi. See Ficus.
306 Pinus excelsa, fr. Nipal.
Wood remarkably compact.—Sp. 3 inch. diam.; 6 layers.
307 Pinus longifolia, fr. Nipal.
Excellent timber, like Memel deal.
308 Pinus Brunoniana, fr. Nipal.
Wood soft, and of no value.
309 Pinus Webbiana, fr. Nipal.
Sp. 7 inch. diam.; exterior layers soft, and of no value; interior ones harder and finer-grained.
310 Pinus Dammara? fr. Tavoy.
A very large tree; used for beams and rafters.
311 Pinus Deodara. Himalaya Cedar, fr. Nipal.
Wood very fragrant.
Pithogarkh. See Chrysophyllum.
312 Plumeria alba, fr. Bot. G.
A West Indian tree.
313 Plumeria acuminata, fr. Bot. G.
A West Indian tree. Every part, both of this and of the foregoing, full of milky juice.

314 Podalyria napalensis. Potugalla, N.; Oosihu, P.; fr. Nipal.

315 Podocarpus macrophylla. Goonsi, N. fr. Nipal.
The peduncle of the fruit, but not the fruit itself, is eaten.

316 Polygonum. Tuknee, P.; Tauntul, N.: fr. Nipal.
Used only for fire-wood. The young shoots have a pleasant acidulous taste, and are eaten.

317 Polypodium giganteum. A tree-fern, fr. Nipal.
A stem, 45 feet in height, and proportionately thick, was presented by the Directors of the East India Company to the British Museum.

Poma. See Cedrela.

318 Pongamia atropurpurea, *Wall.* Lazun, B.; Choo-kha, T.; fr. Martaban.
A noble forest-tree; native of environs of Amherst and Moulmein, on the Martaban coast: the wood used in boat and house building; flower of a dark purple colour.

Popeeah. See Acacia.

Potugalla. See Podalyria.

319 Premna spinosa, fr. Bot. G.

320 Premna. Toomulse, N. fr. Nipal.

321 Premna hirsina. Chikagambhari, fr. Gualpara.
Is often found 6 feet in girth; the wood has a strong odour like the musk rat; it is used for making musical instruments, and for other uses. It is said that no insect will eat it.—*Ham.*

322 Premna flavescens. Bukdholi, fr. Gualpara.
3 cubits in girth; wood very inferior to the foregoing.—*Ham.*

Pregulsee. See Ehretia.

323 Prunus glaucifolia. Ranipeeplee, N. fr. Nipal.
A large tree.

324 Prunus adenophylla. Aroo, P. fr. Nipal.
A large tree.—Sp. 2·5 inch. diam.; fibre white and glossy; rays brown, distinct; tubes rather small; wood light and soft, but harder and reddish brown near the centre.

325 Prunus ferruginea, fr. Nipal.

326 Psychotria rotata, fr. Nipal.
Sp. 3·5 inch. diam.; axis very eccentric; wood pale reddish brown, dull, fine-grained, moderately hard.

327 Pterocarpus? Puddow, B. fr. Tavoy.
A large tree; wood used for furniture and musical instruments.

328 Pterocarpus? Thoun-kheea, B. fr. the river Attran, in Martaban.

Puddow. See Pterocarpus.

Pullowa. See Garcinia.

Puzzeen-zwa. See Ternstroemia.

Pynathe. See Artocarpus.

329 Pyrus indica, *Roxb.?* Mehul, P.; Passi, N.; fr. Nipal.
Sp. 2·5 inch. diam. wood brown, compact, moderately hard, very fine-grained; tubes exceedingly small; bark very thin, composed of 9 brown layers alternating with as many white ones; the thickness of the whole scarcely $\frac{1}{8}$ of an inch.

330 Pyrus vestita. Goohor, N. fr. Nipal.
Sp. 3·6 inch. diam.; about 20 layers; wood soft, compact, of a pale colour, nearly dull.

331 Pyrus foliolosa, fr. Nipal.
A climber.—Sp. 2·5 inch. diam.; wood pale brown, fine-grained, nearly dull, moderately hard.

332 Pyrus ursina, fr. Nipal.

333 Quercus spicata, fr. Nipal.

A very large tree; wood very like English oak; every 7th or 8th ray much thicker than the others.

334 Quercus semecarpifolia. Ghese and Cusroo, N. fr. Nipal.

A very large tree, from 14 to 18 feet in girth, at 5 feet above the ground; clear trunk from 80 to 100 feet.—Sp. 3·5 layers in 2·4 inches; wood light pale brown; rays small, uniform.

335 Quercus lamellosa. Shulshee and Phrarat, N. fr. Nipal.

Wood very hard, straight-grained, and good, of a pale brown colour; rays uniform.

336 Quercus. Bunaroo, P., Gomulsee, N. fr. Nipal.

Wood soft, works as easily as deal; fibre grey, with considerable lustre; rays uniform, reddish brown, very distinct; layers indistinct; heart reddish brown.

337 Quercus lanata, fr. Nipal.

A very large tree.—Sp. bad.

338 Quercus lamellata, fr. Nipal.

339 Quercus polyantha, *Lindl.* Soosi-Singhali, N. fr. Nipal.

340 Quercus. Tima, fr. Gualpara.

Leaves entire; acorns covered entirely by an unarmed cup formed of concentric rings; timber not more than 3 cubits in girth; used for coarse furniture.—*Ham.*

341 Quercus Amherstiana, *Wall.* Tirbbae, B.; Ryakle, T.; fr. Martaban.

Grows to a large size; wood used in boat-building, &c.

342 Quercus, from the mountains called Taong-Dong, near Ava.

Ranipeeplee. See Prunus.

343 Rhamnea, fr. Nipal.

A large climber.—Sp. 1·8 inch. diam.; heart moderately compact; outer part coarse-grained, rather hard.

344 Rhamnea. Bungla, fr. Gualpara.

5 cubits in girth; used for chests, stools, and other coarse furniture.

345 Rhamnus (Premna ?) Gondsori, fr. Gualpara.

5 cubits in girth; used for canoes and chests.

346 Rhamnus virgatus, fr. Nipal.

Wood very hard and heavy; the heart a bright-red brown, not unlike English yew.—Sp. 3·5 inch. diam.; tubes very irregular; rays scarcely visible.

347 Rhododendron arboreum. Ghorans or Ghonas, P.; Tuggoo, N.; fr. Nipal.

The wood resembles plum-tree; used for gun-stocks.

348 Rhododendron arboreum (white-flowered variety). Teuggoo Tuggoo (Teuggo means white), N.; Saphed Gonos or Ghorons, P.; fr. Nipal.

Grows to a large size.—Sp. 6 inch. diam.; wood rather hard, pale brown; rays in the outer layers very distinct; tubes few and large; layers indistinct.

349 Rhododendron campanulatum. Cheriala, P.; Teotosa, N.; fr. Nipal.

A large tree.—Sp. 3·1 inch. diam.; 26 layers, very distinct; rays indistinct: tubes hardly visible.

350 Rhus Bukkiamela, *Roxb.* Subuchunsee, N.; Bukkiamela, P.; fr. Nipal.

Timber good and large.—Sp. 3·5 inch. diam.; greyish white, with considerable lustre; soft, light.

351 Rhus ? Dubdubea ? P. ; Guarnusi, N. ; fr. Nipal.
Sp. 3 inch. diam. ; layers about 10 : fibre light cream-colour, with high lustre ; rays distinct, reddish brown ; wood very light and soft ; bark thin.

352 Rhus succedaneum, fr. Nipal.
A large tree.

353 Rhus juglandifolium, *Wall.* Chose, N. ; Bhalaeo, P. ; fr. Nipal.
Very like the Japan varnish-tree.—Sp. 3·5 inch. diam. ; heart red-brown, the tubes being filled with a substance of this colour ; wood soft, bears a considerable resemblance to the Lauri, with indistinct rays.

354 Rondeletia cana, *Wall.* fr. Nipal.

355 Rondeletia coriacea, *Wall.* Kongeea, P. ; Julsi, N. ; fr. Nipal.
Wood close-grained, and becomes of the colour of mahogany some time after it has been cut ; layers very indistinct : used for rafters, tools, &c. A red dye is also prepared from it.

356 Rosa macrophylla, *Lindl.* fr. Gossain-Than, in the Himalaya.

357 Rottlera. Teeta-kath, N. ; Labtesee, P. ; fr. Nipal.

358 Rottlera (perhaps tinctoria), fr. Nipal.
Wood pale brown, compact, hard, fine-grained ; bark very thin.

359 Rottlera tinctoria, fr. Nipal.
Fruit used as a red dye.

360 Rottlera arborea, fr. Nipal.
Wood light, coarse, soft, worm-eaten : inner bark stringy.

361 Rottlera ? Keoun-lae, B. fr. Tavoy.
A large tree ; wood used for rudders, &c.

362 Rottlera. Memasho, B. fr. Tavoy.

363 Rubus Gouriphul. R. ellipticus, *Sm.* Escallo, P. ; Eesi, N. ; fr. Nipal.
Common in hedges ; as thick as a stout arm ; fruit eatable.

364 Sabia parviflora. Mhasoosee, P. and N. fr. Nipal.
Bark spongy, of a yellow colour ; sometimes used for marking the forehead.

365 Salix. Bhoelasi, P. and N. fr. Nipal.
A small tree, not more than 8 or 10 inches in diameter.

366 Salix babylonica. Tissee and Bhosee, N. and P. fr. Nipal.
Attains an enormous size.

367 Salix, fr. Nipal.

Saljam. See Calyptranthus.

368 Sandoricum. Thittoo, B. fr. Tavoy.
Wood used for furniture.

Saora. See Trophis.

Saphed-gonos. See Rhododendron.

Saphew. See Xanthoxylon.

369 Sapindacea. Dophari, fr. Gualpara.
A small tree ; used for coarse furniture.—*Ham.*

370 Sapotea ? Palaepean, B. fr. Tavoy.
Leaves most beautifully silky and gold colour beneath. A very large tree ; wood used in building.

Saul or Sâl. See Shorea.

371 Schinus Niara, *Ham.* Niyor, fr. Gualpara.
5 cubits in girth ; a hard, close-grained rather brittle wood, with a resinous scent ; preferred by the natives to almost any other for furniture.—*Ham.*

372 Schoepfia fragrans, fr. Nipal.
Sp. 2·5 inch. diam. ; a coarse, light, soft wood.

373 Scytalia Longan, Bot. G.

374 Scytalia Litchi, Bot. G.

375 Securidaca reniformis, fr. Nipal.
Sp. a soft white wood; rays of the same colour as the fibre.

Seesaong. See Aralia.

376 Semecarpus Anacardium. Marking-nut, fr.
Wood soft, and full of acrid juice; not used.

377 Shorea robusta. Saul or Sâl.
This is the staple timber of Hindostan for building purposes: vast quantities of dammar, or resin, are extracted from it, as well as from Dipterocarpus and Hopea, all of which belong to one family, the Dipterocarpeæ.

Sida. See Lagerstroemia.

Signa. See Turpinia.

Silapoma. See Myginda.

Sinna. See Budlæa.

Sissoo. See Dalbergia.

378 Smilax. Doduan, P. and N. fr. Nipal.

Sonalu. See Cassia.

379 Sonneratia? Thaumma, B. fr. Tavoy.
A small tree.

380 Sonneratia apetala, Bot. G.

Soosi-Singhali. See Quercus.

381 Sphærocaria edulis. Bun-amb, P.; Lushpoo, Ael, or Ealmarisee, N.; fr. Nipal.
Used for posts and for fire-wood.—Sp. the wood has a handsome grain, like Sycamore, but with scarce any lustre: rays very distinct, of the same yellowish grey colour as the fibre.

382 Sphærosacme fragrans, fr. Nipal.
A coarse, rather soft, dusky-coloured wood, without lustre.

383 Spondias axillaris. Lupshe, N. fr. Nipal.
Sp. 2·8 inch. diam.; layers about 11; fibre white, with considerable lustre; rays moderately distinct; tubes rather large.

384 Spondias. Sillaephul, N. fr. Nipal.

385 Spondias acuminata, Bot. G.
A large tree.

386 Spondias Amara. Amra, fr. Gualpara,
Grows to a good size, but is not made use of.—*Ham.*

387 Sterculia? Kuneenee, B. fr. Tavoy.
Attains an enormous size. An oil is extracted from the wood by incision, which is used for torches.

388 Sterculia. Thikadoo, fr. Tavoy.

389 Sterculia angustifolia, fr. Bot. G.

390 Sterculia. Bahelli, fr. Gualpara.
5 cubits in girth; used for canoes.—*Ham.*

391 Sterculia urens. Odla or Hatchanda, fr. Gualpara.
5 cubits in girth; used for canoes. A coarse rope is made from the bark, which is used in taking wild elephants.—*Ham.*

392 Stravadium acutangulum. Hendol, fr. Gualpara.
3 cubits in diameter; the wood much used, but neither strong nor handsome.—*Ham.*

Subuchunsee. See Rhus.

Suslendi. See Acer.

393 Syndesmis Tavoyana, *Wall.* Kee-tha, B.; red-wood; fr. Tavoy.
A very large tree; used in building, and for boxes, &c.

394 Symplocos. Gooki, N. fr. Nipal.
A tall, slender tree; wood not esteemed. Most of this genus produce a yellow dye.
395 Symplocos floribunda, fr. Nipal.
A large tree, wood fine-grained.
396 Symplocos? Kalikath, P.; Paunlah, N.; fr. Nipal.
A large tree.—Sp. wood white, compact, of a very fine-grain, and as soft as deal; no tubes visible; rays indistinct; bark as thin as paper.
397 Symplocos. Bulsima, fr. Nipal.
398 Symplocos? fr. Nipal.
A large tree.—Sp. 3 inch. diam.; wood cream-brown, moderately hard.
399 Symplocos pulcherrima, fr. Nipal.
A small tree.
400 Symplocos lucida, fr. Nipal.
Sp. 3 inch. diam.; rays indistinct; wood rather hard, very fine-grained, with little lustre.
401 Symplocos? Kain-tha-phogee, B. fr. Tavoy.
13 to 17 feet long, 6 to 12 inch. diam.; used for posts and oars; affords good but small crooked timber.
402 Symplocos. Kunneen-keunkee or Kunneen-keunla, B. fr. Tavoy,
Used for beams, posts, &c.
Taila-oon. See Carapa.
Tantheya. See Hopea.
403 Tantheya, B. fr. Tavoy.
Tapahaw. See Laurina.
404 Tanguet nee, fr. Tavoy.
6 to 8 fathoms long, 15 to 20 inch. diam. Does not saw kindly.
Tauntul. See Polygonum.
405 Taxus virgata, *Wall.* Dheyri, P.; Lolsi, N.; fr. Nipal.
Grows to a large size: the green branches are used to adorn houses during certain festivals; timber strong and good.—Sp. 6·5 inch. diam. Axis very eccentric, 5 | 1·5; all the layers cannot be counted. On the widest side of the axis are 27 layers in 0·85 inch. beginning from the axis; near the outside are 18 layers in 0·9 inch.; wood softer, of paler colour, and less lustre than English yew.
Teak. See Tectona.
406 Tectona grandis. Teak, fr. Martaban.
Several specimens of various qualities.
Teetakuth. See Rottlera.
Tendoo. See Diospyros.
Tengaun. See Hopea.
Teotosa. See Rhododendron.
407 Terminalia. Thuphanga, B. fr. Tavoy.
408 Terminalia bialata, fr. Martaban.
409 Terminalia Bellerica. Bauri, fr. Gualpara.
6 feet in girth; used for canoes: the fruit and bark used by tanners.—*Ham.*
410 Terminalia Catappa, fr. Bot. G.
A noble and most ornamental tree: wood very good.
411 Terminalia moluccana. Joynal, fr. Gualpara.
3 cubits in girth; used in boat-building, as the timber is both light and durable.—*Ham.*
412 Terminalia Hilka. Hilkha, fr. Gualpara,
6 feet in girth; used for canoes and for furniture.—*Ham.*

413 Ternstroemia napalensis, *De Cand*, fr. Nipal.
Sp. 3 inch. diam. Outer layers with very distinct rays, of a reddish brown; wood soft and spongy.
414 Ternstroemia. Puzzeen-zwa, B. fr. Tavoy.
A rather large tree, used for posts and rafters.
415 Tetradium? cymosum, *Wall.* fr. Nipal.
416 Tetradium? fr. Nipal.
A very large tree.
417 Tetranthera caduca. Pangch-Petiya, fr. Gualpara.
6 feet in girth; used for chests and common carpentry.—*Ham.*
418 Tetranthera. Haola, fr. Gualpara.
3 feet in girth; wood close and soft; used for coarse furniture.—*Ham.*
419 Tetranthera Paromouja. Paromouja, fr. Gualpara.
6 feet in girth; wood close and soft; used for coarse furniture.—*Ham.*
420 Tetranthera Dorodmeda. Vagnal or Bagonal, fr. Gualpara.
3 cubits in girth; used for coarse furniture.—*Ham.*
421 Teutha, B. fr. Tavoy.
Thathee. See Bignonia.
422 Thauga-et-thittoo, fr. Tavoy.
3 to 5 fathoms long, 8 to 12 inches diam. An inferior wood, used in small buildings.
423 Thau-baun-po, fr. Tavoy.
5 to 8 fathoms long, 12 to 18 inches diam. An inferior light wood, used for small canoes.
424 Thau-baun-thau-lay, fr. Tavoy.
6 to 12 fathoms long, 13 to 20 inches diam. Wood very pliant; little inferior to Hopea, but does not saw so kindly.
Thaumma See Sonneratia.
Thaun. See Eurya.
425 Theyah, fr. Tavoy.
4 to 6 fathoms long, 10 to 15 inches diam. An inferior wood, used in small buildings.
Thikadoo. See Sterculia.
Thittoo. See Sandoricum.
Thitya. See Laurus.
Thoun-ben. } See Artocarpus.
Thoun-pine. }
Thounkheea. See Pterocarpus.
426 Thounmynga, B. fr. Tavoy.
A middle-sized tree, used in house-building.
Thounsanga. See Myristica.
Thubbae. See Mimusops, Uvaria, Ficus.
Thubboobamboo. See Anacardium.
Thuggainee. See Bignonia.
Thuggoo. See Rhododendron.
427 Thunbergia coccinea, fr. Nipal.
Thaumagee. See Elæocarpus.
Thuphanga. See Terminalia.
Thuppan. See Ficus.
Thurape. See Callophyllum.
Thurratha. See Excœcaria.
428 Thymboo, B. Thau-baun-po, fr. Tavoy
5 to 10 fath. long. 15 to 20 inches diam. Good strong durable light wood; used in boat-building; does not saw kindly.

Tima. See Quercus.
Timbhus. See Xanthoxylon.
Tirbbue. See Quercus.
Tissee. See Salix.

429 Tomex, or Litsæa Japonica. Uluyaohama, fr. Gualpara.
6 feet in girth ; used for small canoes.—*Ham.*

Toomulsee. See Premna.
Toon. See Cedrela.

430 Town-pine, fr. Tavoy.
7 to 8 fathoms long, 18 to 30 inches thick ; used in boat-building ; reck oned little inferior to Hopæa.

431 Trophis ? aspera. Saora, fr. Gualpara.
3 cubits in girth ; used for joiner's work.—*Ham.*

Tuknee. See Polygonum.
Tukra. See Bauhinia.
Tunabeng. See Artocarpus.
Tungnusi. See Cinchona.

432 Turpinia pomifera. (Dalrymplea), Phurasee and Signa, N. fr. Nipal.
A large tree ; wood of a dull grey colour, light, soft, compact, free-working, splits easily ; not applied to any particular use.—Sp. 3·2 inch. diam. ; rays indistinct ; tubes very small ; bark thin, and the inner layer almost black.

433 Ulderoo, fr. Bombay.
Very little liable to split, and therefore used for fuses for bomb-shells.

Uluyaohama. See Tomex.

434 Uncaria pilosa, fr. Nipal.
A small and imperfect specimen.

Uriam. See Andrachne.

435 Urtica. Jeonagkun, N. ; Latasishnoo, P. ; fr. Nipal.
436 Urtica salicifolia, fr. Nipal.
437 Urtica pulcherrima, fr. Bot. G.
438 Uvaria. Thubboo, B. fr. Tavoy.
A large tree, used in boat-building.

439 Uvaria suberosa. Bandorkola, fr. Gualpara.
3 cubits in girth ; a close-grained, soft, brittle wood ; used for posts, beams, and planks.—*Ham.*

Vagnal. See Tetranthera.

440 Vangueria edulis. Moyen, fr. Gualpara.
A small timber tree, 4 feet in girth ; used for coarse furniture.—*Ham.*

441 Vernonia. Magor, fr. Gualpara.
3 cubits in girth ; used for coarse furniture. The only one of the numerous tribe of corymbiferous plants that grows to be a timber tree.

442 Vibernum ? Loshima, N. fr. Nipal.
443 Vibernum erubescens, fr. Nipal.
A small-sized tree.

444 Vibernum cordifolium, fr. the Himalaya.

445 Vitex acuminata. Angchhui, fr. Gualpara.
3 cubits in girth. A very close, hard, brittle wood ; used for mortars of oil-mills, feet of bedsteads, &c.—*Ham.*

446 Vitex Babula. Babla, fr. Gualpara.
3 cubits in girth ; wood close, soft, tough ; used for coarse furniture, but in little estimation.—*Ham.*

447 Vitex Leucoxylon. Bhodiya, fr. Gualpara.
3 cubits in girth ; used in making ploughs ; will grow on land that is inundated for weeks together.—*Ham.*

448 Vitis or Cissus, fr. Nipal.
Sp. 4·5 inch. diam.; wood spongy and very coarse-grained; fibre very small in proportion to the tubes, which are many and large; rays very distinct, of a reddish brown colour, forming a handsome waved figure; bark stringy.

449 Wrightia gigantea, *Wall.* fr. Nipal.
A large climber.—Sp. 2·5 inch. diam.; 10 layers; wood whitish, with considerable lustre; rather soft.

450 Wrightia antidysenterica. Lathon, B. fr. Tavoy.
A small tree; not used.

451 Wrightia tinctoria. (Indigo tree.)
The leaves yield indigo. The wood is "beautifully white, close-grained, coming nearer to ivory than any other known to me."—*Roxb.*

452 Xanthophyllum. Saphew, B.; Choo-muna, T.; fr. Martaban.
Very large; wood used for posts and rafters.

453 Xanthoxylon alatum. Timbhus, P. and N. fr. Nipal.
Wood soft and open-grained, like aspen; bark very tubercular.

454 Xylocarpus. Keannan, B. fr. Tavoy.
Timber from 10 to 20 feet long; very durable; used for furniture and in house-building.

Zeethee. See Ziziphus.

Zimboon. See Dillenia.

Zitha. See Castanea.

455 Ziziphus incurva. Harobaer, P.; Kadabusi, N.; fr. Nipal.
Wood in considerable estimation.—Sp. 3·5 incb. diam.; fibre brownish white, with little lustre; rays in tbe outer layers distinct, but of the same colour as the fibre; bark coarsely fibrous.

456 Ziziphus. Zeethee, B. fr. Tavoy.
Wood bard and durable.

III.—*Table for ascertaining the Heights of Mountains from the Boiling Point of water. By* James Prinsep, *Sec., &c.*

A correspondent has suggested to me that many readers of the Journal are anxious to possess a ready means of measuring heights by the temperature of boiling water, as it frequently happens that they find themselves in situations where this simple method may be applicable when it is out of their power to resort to the more generally practised operation with a barometer.

I have accordingly drawn out a table founded on the best procurable data of the present time: but it must not be concealed that sufficient accuracy has not been attained in experimental researches on steam of low temperatures to warrant implicit reliance upon the results; for although, since the important application of steam as a motive power, numerous experiments have been made to ascertain the *elastic tension* which it exerts at different temperatures both below and above the ordinary boiling point; still, *below* 212°, the points fixed by experiment are at intervals of several degrees asunder, and there is no thorough accordance between those of different experimenters.

Perhaps it is necessary to explain, that the boiling point is that degree of heat at which the elastic force of aqueous vapour is just capable of counterpoising the pressure of the atmosphere, or the weight of the column of mercury in a barometer. The method then of discovering the law of progression of the tensions has generally had for its basis the exposure to heat of a portion of water in a closed vessel, such as a glass tube or a small boiler, under the pressure of a column of mercury, measuring the height to which the latter is raised at different temperatures.

Betancourt, Schmidt, Dalton, Watt, Creighton, Southern, Taylor, and more recently Ure, Arsberger, Perkins, and Dulong (assisted by a commission of the French Academie), are some of the illustrious names which are connected with these researches experimentally; while Robison, Young, Ivory, Laplace, Prony, Tredgold, Coriolis, Laroche and others have attempted to construct mathematical formulæ, capable of embracing the range of their experiments from the freezing point up to 500° Farh.* It is quite unnecessary for me to enter into any lengthened history of this branch of physics, which the reader will find ably discussed in *Robison's Mech. Phil.*, *Biot*, *Tredgold on the Steam Engine*, *Daniell's Meteorology*, and in the report of Dulong to the Academie on *the experiments made by order of the French Government to determine the elastic force of aqueous vapour at high temperatures.* [*An. Chim.* xliii.]

All the experiments agree in proving the elastic force of steam to follow a geometrical ratio with arithmetical increments of heat. The index of the power representing the law of variation was assumed as 5.13 by Southern, 6 by Creighton, 7 by Young, by Coriolis 5,355, and by Dulong 5. But the formula of Tredgold is acknowledged to agree more closely with experiments below 300° than any other:—his exponent is also 6, with a different co-efficient; if f = elastic force, and t temperature, then by his formula

$$f = \left(\frac{t + 100}{177}\right)^6; \text{ or } t = 177\, f^{\frac{1}{6}} - 100$$

in logarithms

$$\log. f = 6\ (\log.\ (t + 100) - 2.247968)$$

* The experiments of the French Academicians Baron de Prony, Arago, Gerard and Dulong, in 1829, extend to the temperature of 435° Fahrenheit, or a pressure of 24 atmospheres, which they measured by absolute pressure of a column of mercury *sixty feet high* in a glass tube attached to the tower of the Old Church of Sainte Geneviéve:—they were afraid of passing this limit, as the least explosion would have brought down the tottering fabric. Their glass tube was jointed and ingeniously supported: Mr. Daniell has however since worked with *single* glass tubes of 40 feet long, in his water barometer experiments. We deal now-a-days boldly with feet, where inches were formerly thought sufficient!

With this formula I had constructed a table from 214° to 180°, when I perceived that the calculated pressures gradually gained upon the experimental ones within the same range, until at 180°, the difference was a full third of an inch. This will be seen in the diagram of Plate VIII, and in the following comparative table:

Temperature	Calculated Tension by Tredgold's formula	Observed Tension	Differences	Observer
°	in.	in.		
212	30.00	30.00	0	assumed
210	28.86	28.88	+.02	Ure
210	28.86	28.82	—.04	Robison
202	24.68	24.37	—.31	Wollaston
200.75	24.07	24,00	—.07	Dalton
200	23.71	23.60	—.11	Ure
200	23.71	22.86	—.85	Robison
190	19.35	19.00	—.35	Ure
189.5	19.15	18.80	—.35	Dalton
182	16.35	16.01	—.34	Southern
180	15.67	15.16	—.51	Ure
180	15.67	14.73 ?	—.94	Watt
178.25	15.10	14.60	—.50	Dalton
173	13.46	13.18	—.28	Dalton
172	13.17	12.72	—.45	Southern

Robison's numbers are much too low: the others, Dalton's, Southern's, and Ure's, agree pretty well together, gradually separating from the curve of Tredgold's formula. On the supposition that the experimental results, when they evince so much regularity, are more trustworthy than the calculus, (which is indeed empirically formed to suit them), I have made a deduction of [0.01 inch × number of degrees below 212], from the numbers in Tredgold's column, and then I find that the experimental and theoretical curves coincide very well throughout the range required for our purpose.

The extreme difference at 180° will thus amount to

	inches.		
log. of	15,67	=	1.19511
log. of	15,31	=	1.18611
			.00900

=90 fathoms or 540 feet, a quantity of too much magnitude to be passed over.

Having thus explained the construction of the following Table, I will proceed to make a few remarks on the mode of using the instrument to which it applies.

The Rev. F. J. H. Wollaston was the first to introduce the thermometer practically as a substitute for the barometer in measuring heights. His plan was merely to render the thermometer more delicate by increasing the bulb, and allowing the mercury to enter the capillary tube only when it approached the boiling point, so that a few degrees occupied the whole scale, and by a sliding nonius each degree could be divided into 200 parts or more. But it is evident that to compete with the barometer in *accuracy of indications*, the scale must have a range of the same length as that of the barometer,—say 15 inches, and the instrument would thus become fragile and unwieldy: to obviate this inconvenience, he formed a reservoir above the capillary tube, containing a small supply of mercury, so that when the boiling temperature should be so reduced as to bring the reading point to the foot of his 6-inch scale, a portion of mercury was to be added to bring it to the top of the scale, by an operation so delicate and difficult that I may safely say, and from experience too, that few travellers would resort to it in the field, and fewer still succeed if they attempted it. In 1817, he exhibited his thermometer to the Royal Society, and in 1820, he applied it to the measurement of Snowdon. On the latter occasion, he drew up a table of the value of the degrees between 214° and 202° in feet, founded on Doctor Ure's empirical formula of tensions; but, as this range only extends to an altitude of 5405 feet, it is evidently quite insufficient for the traveller in India, who may ascend to 18,000 feet and still see *Snowdons* towering above his head.

The error into which Wollaston fell was an attempt at too great sensibility. His instrument is beautiful in a laboratory, where it will serve to shew minute variations in the index error, as it may be called, of a barometer in the course of years, as I have frequently proved. But for rough work out of doors, accuracy must in some measure be sacrificed to strength and portability, the points in which alone the thermometer can boast superiority over the barometer. Captain Herbert was so well aware of this, that he had provided himself from England with ordinary thermometers divided, from 180° upwards, to the tenths of degrees: half a division thus represented about 25 feet, which in most cases was ample, especially when the zero of elevation, or level of the sea, was 1000 miles distant.

All who possess thermometers, therefore, divided to tenths of inches, may convert them into measurers of height, by attending only to a few trifling precautions in their use.

1. The *prime* boiling point 212° should be accurately verified by comparison with a good barometer, for the divisions of the instrument-makers are by no means to be trusted within the requisite limits. Thus,

on some standard thermometers in the Surveyor General's office, in our experiments on the standard bar, we found the boiling point erroneous *two degrees:* and Lieut. BURNES found his thermometer boil on the Caspian Sea at 213°⅛ which would make its surface 700 feet below the level of the Mediterranean, whereas it is only suspected of half that depression.

2. The metal or wooden scale should be cut off at some height above the bulb, as otherwise it is very difficult to obtain the temperature correctly, or even to attain full ebullition, on account of the rapid abstraction of heat by the scale, particularly if it be of metal.

3. The vessel in which the water is boiled should be of metal, closed loosely with a cover or cork through which the thermometer may pass, so that the bulb may remain a trifle above the surface of the water. To those who cannot provide themselves with a boiler similar to that of WOLLASTON, a shaving pot will be found to answer sufficiently well. The steam should issue freely through the vent for some time before the reading is taken.

A word or two, now, on the mode of applying the following table to the calculation of the height required.

1. When the thermometer has been boiled at the foot and at the summit of a mountain, nothing more is necessary than to deduct the number in the column of feet opposite the boiling point below, from the same of the boiling point above:—this gives an approximate height, to be multiplied by the number opposite the mean temperature of the air in Table II. for the correct altitude.

			feet.
Example.	Boiling point at upper station	201.5 =	5600
	Ditto ——— at lower station	211.3 =	350
		Approximate height,	5250
Temperature of air, above, 35°			
below, 50			
	Mean 42,5 = multiplier,.....		1.022
		Correct altitude, ... ft.	5365.5

2. When the boiling point at the upper station alone is observed, and for the lower the level of the sea or the register of a distant barometer is taken, then the barometrical reading had better be converted into feet by the usual method of substracting its logarithm from 1,47712 (log. of 30 inches) and multiplying by .0006, as the differences in the column of "barometer" vary more rapidly than those in the "feet" column.

feet.

Example. Boiling point at upper station .. .. 185° = 14548
Barom. at Calcutta (at 32°) 29.75
Logar. diff. = 1.47712— 1.47349 = ,00363 ×.0006 = 218

Approximate height 14330

Temperature, upper station, 76° } 80 = multiplier 1.100
Calcutta, .. 84° }

Correct altitude, ft. 15763

3. Assuming 30.00 inches as the average height of the barometer at the level of the sea (which is however too much), the altitude of the upper station is at once obtained by inspection of table I, correcting for temperature of the stratum of air traversed, by table II.

TABLE I.—*To find the Barometrical Pressure and Elevation corresponding to any observed temperature of boiling water between* 214° *and* 180°.

Boiling point of water.	Barometer (modified from Tredgold's formula.)	Logarithmic differences (or fathoms).	Total Altitude from 30.00 in. or the level of the Sea.	Value of each degree in feet of Altitude.	Proportional part for one-tenth of a degree.
o	inches.		feet.	feet.	feet.
214	31.19	.00 84,3	—1013	—505	
213	30.59	84,5	— 507	—507	
212	30.00	84,9	0	+509	
211	29.42	85,2	+ 509	511	51
210	28.85	85,5	1021	513	
209	28.29	85,8	1534	515	
208	27.73	86,2	2049	517	
207	27.18	86,6	2566	519	52
206	26.64	87,1	3085	522	
205	26.11	87,5	3607	524	
204	25.59	87,8	4131	526	
203	25.08	88,1	4657	528	
202	24.58	88,5	5185	531	53
201	24.08	88,9	5716	533	
200	23.59	89,3	6250	536	
199	23.11	89,7	6786	538	
198	22.64	90,1	7324	541	54
197	22.17	90,5	7864	543	
196	21.71	91,0	8407	546	
195	21.26	91,4	8953	548	
194	20.82	91,8	9502	551	55
193	20.39	92,2	10053	553	
192	19.96	92,6	10606	556	
191	19.54	93,0	11161	558	
190	19.13	93,4	11719	560	56
189	18.72	93,8	12280	563	
188	18.32	94,2	12843	565	
187	17.93	94,8	13408	569	57
186	17.54	95,3	13977	572	
185	17.16	95,9	14548	575	
184	16.79	96,4	15124	578	58
183	16.42	96,9	15702	581	
182	16.06	97,4	16284	584	
181	15.70	97,9	16868	587	
180	15.35		17455		59

The fourth column gives the heights in feet.

TABLE II, *of Multipliers to correct the approximated Height for the Temperature of the Air.*

Temp. of Air.	Multiplier.	Temp. of Air.	Multiplier.	Temp. of Air.	Multiplier.
°		°		°	
32	1,000	52	1,042	72	1,083
33	1,002	53	1,044	73	1,085
34	1,004	54	1,046	74	1,087
35	1,006	55	1,048	75	1,089
36	1,008	56	1,050	76	1,091
37	1,010	57	1,052	77	1,094
38	1,012	58	1,054	78	1,096
39	1,015	59	1,056	79	1,098
40	1,017	60	1,058	80	1,100
41	1,019	61	1,060	81	1,102
42	1,021	62	1,062	82	1,104
43	1,023	63	1,064	83	1,106
44	1,025	64	1,066	84	1,108
45	1,027	65	1,069	85	1,110
46	1,029	66	1,071	86	1,112
47	1,031	67	1,073	87	1,114
48	1,033	68	1,075	88	1,116
49	1,035	69	1,077	99	1,118
50	1,037	70	1,079	90	1,121
51	1,039	71	1,081	91	1,123

Enter with the mean temperature of the stratum of air traversed; and multiply the approximate height by the number opposite, for the true altitude.

The table of Tensions (tab. I.) is still avowedly imperfect. We see that the force of vapour for 210°, as found by observation, differs several hundredths of an inch from the formula of either DALTON, URE, or TREDGOLD, although only two degrees distant from the fixed point 212°. Nor can it surprise us to find it so, because its experimental determination, by heating vapour inclosed within the thick glass of a barometer tube, is necessarily subject to much more uncertainty than the obvious measurement of the boiling point, under a given pressure of the air. On the mountains of India, at Simla, Súbathú, Chirra Púnjí, and even *Spití*, wherever in short there may be observers in possession of good barometers, the power exists of rendering an essential service to physics by fixing so many points on the scale of tensions, in the latter more unexceptionable manner. For instance, an observer at Chirra, by carefully noting the heat of his boiling tea-kettle every morning, and inserting it in his register, together with the accurate height of the barometer, would determine that part of the thermometric scale corresponding to 25 and 26 inches of pressure. So with observations at Ságur, for 28 inches; at the Nilgherries for 21 inches; and in the Himálaya for even 15 inches: and I hope that this notice may have the effect of inducing this new and interesting species of *synthetical* research, as a check upon the scales framed on an opposite system in the laboratory.

IV.—*Translation of a Tibetan Passport, dated A. D.* 1688. *By* M. Alex. Csoma de Körös.

[Read 24th April, 1833.]

In Hyde's *Historia Religionis Veterum Persarum* (2nd edition, page 552-3), there is an engraving of a passport granted by the governor (or grand Lama) of *Lassa*, to an Armenian, of which, at the time of its publication, no European was able to decypher the characters. The learned author's account of it is in the following words:

" Secundò damus *Scripturam Tatarorum de Boutan** (al. *Boutunt)* citra *Imaum* supra *Indiam*. Hujus lectio est á dextrâ†: et hocce ejusdem elegantissimum specimen est, id quod vulgò sonat, *un passport*, seu *salviconductûs* literæ, à principe urbis et provinciæ de *Boutan* datæ, nuperis annis, *Chogja Ouanni* (i. e. Domino Joanni) mercatori *Armeno* ibidem negotianti: et dictus princeps nomen suum (ut vides) *sigilli* loco et forma majusculis et implicatis characteribus infra apposuit. Talis sigilli impressio *arabibus* dicitur توقيع *taukía; Persis et Turcis* طغرا *togrâ*, unde, apud eos, talis majusculorum characterum scriptor, aut talis sigilli factor, vel appositor seu principis subsignator, vocatur *Togräi*. Hanc chartam nobiscum communicavit singularis amicus D. Joh. Evans S. T. D. nuperis annis ex India redux."

The character of this curious manuscript proves to be the small running-hand of the Tibetans, written and engraved with hardly a single error. The following is a version of it in Roman characters, which may be interesting to those who possess Hyde's very learned volume.

Chhos-*h*khor *d*Pal-gyi Lha-sa nas.—*r*Gya-gar *h*phags-yul bar-gyi Sa-lam-du *h*khod-pahi Ser, *s*kya, drag, zhan, Lhahi mi-*r*je *r*dsong *b*sdod *g*nyer las-*h*dsin, Sog, Bod, Hor, *h*Brog, ir-*h*chhihi *h*grul *h*grims, lam *h*phrangs *b*srung *b*kag, *r*gan mi *d*mangs bya-va zhi drag-gis sné slébs *b*chas *m*thah dag-la springs-pa.—Lha-sa p'hun-ts'hogs *l*chang-lo-chan-gyi *h*gron-po *m*Go-*d*kar‡ It'hang-na-chan mi *b*zhi zhon khal *b*chu-drug *b*chas nyé-khohi ts'hong gyur grubs-nas rang yul-du log *h*gro-var *s*tahur-gyi (? Lhahur-gyi) *m*ts'hon gang spyihi par rog nyan-du gang *h*gro-las sné gor *h*p'hrog *b*chom sogs *g*nod *h*gol-du log-par *h*gro-va nyan ma byed-par phar phyir-du *b*de-var *h*grims-chhug.—Zhes sa-*h*brug zla ts'hes-la lugs *g*nyis kyi *m*dun-sa Chhos-*h*khor chhen-po *d*Pal-gyi Lha-sa nas bris.

* *Boutan*, though applied by Europeans and Mohammudans to Tibet generally, is properly the name of one of the southern provinces, called in Tibetan *Llopato*: *Lhassa* is the capital of Tibet Proper or *U-tsang*. [See Journ. As. Soc. i. 123.]

† This is of course a mistake: the Tibetan reads like the Sanskrit from the left hand.

‡ The name *m*Go-*d*kar (properly white-headed, but rendered by me, above, by Mohammedans) formerly was applied in Tibet both to the Muhammedans of India and to the Europeans. But of late the Tibetans have commenced calling the Europeans by the name of Philing-pa, and an European of British India by that of *r*Gye-Philing (-pa) or Indo-European.

Bod-pahi zla *h*dres med-ching lo-thog mi-khal-gyi *h*khri *s*grub dés *h*gré byung phyin *b*dé-var *h*grims chhug.

A square seal.

Translation.

"From the noble (city) Lhassa, the circumambulating race of religion.—To those that are on the road as far as *Arya Dèsa* or India, to clerical, laical, noble, ignoble lords (or masters) of men; to residents in forts, stewards, managers of affairs, to Mongols, Tibetans, Turks, and to dwellers in tents in the desert; to ex-chis (or el-chis, envoys, or public messengers, vakíls or ambassadors, &c.) going to and fro; to keepers and precluders of bye-ways (or short-cuts); to the old (or head) men, collectively, charged to perform some business of small or great importance; to all these is ordered (or is made known). These four foreign (or travelling) persons resíding at Lhassa, *l*chang-lo-chan, Mohammedans of It'hang-na, after having exchanged their merchandize, going back to their own country, having with them sixteen loads on beasts; having nothing for their defence except some Lahorí-weapons,—do not hinder, rob, plunder, et cetera, them; but let them go to and fro in peace.

Thus has been written from the noble Lhassa, the great religious race, from the senate-house of both ecclesiastical and civil affairs, in Sa-*h*brug* (in the year of T. ch. 1688). On the day of the month. (These dates are wanting).

Note.—There is no Tibetan joined with them. They have about a man's load of victuals wrapped up in a bundle; with that there has been made an increase (of packages), but let them go in peace."

A square seal.

* Sa-*h*brug *(earth's dragon)* is the title of the second year of the Tibetan cycle of sixty years: it corresponds with *Vibhava* of the Indian and *Vú Dhín* of the Chinese cycle. The Tibetan reckoning commences from February, 1026: as therefore Hyde's first edition was printed in 1701, and he uses the expression "*nuperis annis ex India redux*," the MSS. has been referred to the twelfth cycle, then current, which fixes its date to the year 1688.

Colonel Warren in the *Kala Sankalita* (Chron. tab. xxi.) has given a full description of the Indian system;—a catalogue of the Tibetan cycle, which is twofold, one following the Sanskrit, the other following the Chinese system, will be published in the Tibetan Dictionary now preparing for the press.

V.—*Proceedings of the Asiatic Society.*

Wednesday Evening, 24th April, 1833.

The Honorable Sir Edward Ryan, President, in the Chair.

The minutes of the last meeting were read.

Mr. B. H. Hodgson, Resident at the Nipalese Court, the Rev. Josiah Bateman, and Mr. D. Macfarlan, were elected Members.

Read a letter from the Secretary to the Right Hon'ble Sir R. W. Horton, Governor of Ceylon, expressing acknowledgments for his Excellency's election as an Honorary Member, and presenting a copy of the Ceylon Almanac for 1833, containing much unpublished information on the history of Ceylon.

Read a letter from the President of the Central Committee of the Geographical Society of Paris, acknowledging receipt of the 6, 7, 8, 12, 13, 14, 15, and 16 volumes of the Researches.

Read a letter from J. Forshall, Esq. Secretary to the British Museum, acknowledging the receipt of the Journal As. Soc. 1832.

Read a letter from Col. Wm. Casement, Secretary to Government, Military Department, forwarding on the part of the Madras Government:

"Results of the Astronomical Observations made at the Madras Observatory, vol. 1st, 1831, by T. G. Taylor, Esq. H. C. Astronomer."

The following books were presented by the Venerable Archdeacon Corrie, on the part of the Rev. Joseph Wolff.

1. Armenian Calendar, printed at Constantinople in the Armenian Era 1151 or A. D. 1702.

Mr. J. Avdall pointed out the following historical memorandum written on the cover of this work in Armenian, probably at Cabul.

"In the year 1824, on the 23rd July, Habib Ullah Khan was conquered by Dost Mohammed Khan."

2. Devotional Meditations, written by St. Gregory Narekenses, in the beginning of the 11th century, and published at Constantinople in 1185, Armenian Era, or A. D. 1736.
3. Tawáríkh Khán Jahání o Makhzaní Afghánè, 1st vol.
4. Táríkh Akberí.
5. Shojráwalosat Afghání o Faris.
6. Qorán Sheríf.

The following books were presented by Monsieur Murelatour, their author.

1. Premier fruit des trois jours de Gloire, Paris 1831.
2. Le Siege D'Eden Allegorie Orientale, Paris 1827.
3. Triomphe de L'Amour sur le Fanatisme et le Materialisme, Paris 1828.

The following book was presented by the author.

Rasselas, translated into Bengalee, by Maha Raja Kalikishen Bahadur.

Mr. Csoma de Körös presented a Catalogue of the Tibetan Books in the Society's Library, with a recommendation that the numerous duplicates and extra copies of several of them should be presented to learned Societies in Europe*.

* As soon as we are in possession of Tibetan type, we shall give insertion to this valuable catalogue.—Ed.

Antiquities.

Read a letter from W. Storm, Esq. presenting for deposit in the cabinet, the three coins exhibited to the Society on the 5th September, 1832.

These coins were found in estate No. 100 (No. 74 of Captain Prinsep's Soondurbun Map), west of the ruins of Bishenpúr, on the Ishamatí or Jahuna river, near an old temple called *Mót Búré.*

The Secretary noticed a simple method employed by the natives in taking off facsimiles of coins on paper : they dauh a little printer's or *pakka* ink on the projecting parts of the coin, and then transfer it by pressure on to the fleshy part of the thumb —thence a faithful representation is impressed upon the paper, previously wetted, which has the advantage of not being reversed.

Four silver coins found at Agra, 1 of Akber, 2 of Jehangír, and 1 of Alamgír II—*presented by Capt. J. T. Boileau, Engineers.*

Literary.

Translation of a Tibetan Passport, engraved in Hyde's *Religio Persarum.* By M. A. Csoma de Körös.

[This will be found in the present number, p. 201.]

Selections from Mr. Csoma's translations from the *b*Stan-*h*gyur were also read—among them, the letter of RATNAVALI, a young Princess of Ceylon, to SHAKYA, and the reply of the sage. This letter is generally known in Tibet, and is introduced in every collection of epistolary forms.

[The want of Tibetan type obliges us to defer the insertion of this curious morçeau, which however is but a literal translation from the Sanskrit.]

Physical.

A gigantic specimen of Fossil Ammonite, from the Carboniferous Limestone of Swansea, was presented by Lieut. J. A. Crommelin, Engineers.

Read a letter from Lieut. J. T. Smith, Masulipatam, forwarding the Geological specimens of the late Dr. Voysey, alluded to at the last meeting; also the following mentioned in Dr. Malcolmson's letter.

1. Fragment of the Meteorolite, which fell in the Cadapah district 2nd January, 1831*.

2. Fossil Shell and Bone, noticed at the meeting of the 20th February.

3. Limestone from Warapilly, which seems well adapted for Lithographic purposes.

4. Fragment of Bone, from a Cave in the neighbourhood of Hyderabad, explored by Dr. Malcolmson, who gives the following description of it.

"Some interesting facts occurred to me the other morning in a ride to a large mass of granite rock near this, which is rent into fissures of great depth, forming dens inhabited by hyænas and *chítas*, extending through the bottom of the little hill to unknown depths. Having entered one of the rents, I was struck with the masses of fallen rock on each side being covered with stalagmite formed from the water running down from the sides of the rent 40 feet above, and still more by observing that the sides of the narrow passage bore a fine polish, which my companion immediately exclaimed, must be caused by the animals passing out of a cave at the end of the fissure he had been examining. I had the same thing in view, and was at the time observing how far it could be caused by the water. In tracing the same appearance in other places, it was only observed where the animals would necessa-

* Vide GLEANINGS, iii. 389.

rily pass, and, when the stones projected by a sharp point into the path, the angles only were polished. The den was low, and numerous bones lay scattered in the outer parts into which I crawled: the foot marks of the animals were distinct and fresh. Most of the bones were much broken, and the dung of the hyænas near the place were full of large pieces of ribs, unbroken tarsal bones, &c. During the search, I was astonished at the vast numbers of rats' heads and bones found in the place in little heaps, evidently out of reach of the hyænas, and often on the top of insulated blocks; these were below the fissures open at the top, and the dung of hawks readily suggested that they were dropped by these birds, which was confirmed by a large feather of one found with the bones. Some of the bones were surrounded with the fur of the animal, and had been only recently voided; and what was remarkable, the upper and lower jaw were not separated, but the flesh beautifully cleaned away by the digestive process; the other bones were entire, although disunited. In the larger skulls, the back part had been broken, and in one only, crushed. In a few minutes, I removed a plate full of skulls and other bones, amongst which are three species of mus, squirrel, sorex, bats, and birds. Had the rock been of lime and stone, fossil animal remains would have been found. The curious confirmation of Buckland's supposition regarding the polished blocks in the caves appears to me very interesting, as his views stood much in need of illustration from the habits of living species."

Specimens of Fossil Shells from Jabulpúr—*presented by Dr. Spilsbury.*

"The locality of the fossil shells, which I have at length the pleasure to send to the Society, lies about 18 or 20 miles east of Jabalpúr. The first three miles cross a sandy plain, which abruptly terminates at a small rivulet; when the soil changes to the black alluvial one of the valley. At six miles cross the Gour river, a rough ghát of *trap:* the road winds on between trap hills varying from 50 to 300 feet high. I encamped at *Suleya* on the same river (here 200 feet broad): the bed intersected with veins of heliotrope, quartz, massive and crystallized. The road then led through an undulating country, with irregular masses of trap, and for less than a mile beyond, masses of the accompanying shell breecia, from a single shell to large blocks of two feet, extend, mixed with the trap, over a space about 300 feet square. The spot had been under *tillee* cultivation. There was no *nálá* or ravine near, whence I could judge of the nature of the substrata, but at no great distance I could see the trap appearing precisely as in the bed of the river. I asked the lime-burner how he came to discover them? His account was, that he is in the habit of taking small quantities of lime to the neighbouring villages for sale, and in his travels has an eye to the *geological features* of the country as far as limestone is concerned:—passing this field some nine or ten months ago he was struck with the very different appearance and color of the stones,—and hence the discovery of these fossil shells."

The matrix of these shells appears to be indurated clay, and the forms of the shells are in most cases replaced with silicious matter; they resemble, as Dr. Spilsbury suggests, the buccinum and other shells in the Gawelgir range of hills described by Voysey, (GLEANINGS, vol. i. p. 356*.)

Some specimens of Minerals from Manipur, Kachár, Kabú, and Assam, including fossil wood from the Níngti river—*presented by Captain R. B. Pemberton.*

* We hope ere long to present our readers with drawings of these shells.—ED.

VI.—*Miscellaneous.*

1.—Indian Meteorology.

1.—*Meteorological Register kept at Bijnore, (Northern Moradabad,) by E. J. Ravenshaw, Esq,*

	At 10 A. M.		At 4 P M.		Remarks.
	Bar.	Ther.	Bar.	Ther.	
July 21	28,86	86	28,77	87	Rain in the morning.
22	..	..	28,75	87	Fair all day.
23	28,85	88	28,75	90	Ditto, very cloudy at sunset.
24	28,83	82	28,75	83	Rain in the morning and more or less all day.
25	28,90	85	28,75	85	Fair all day.
26	28,83	83	28,75	86	Rain in the morning; fair after 11 o'clock.
27	28,78	85	28,74	84	Wind and rain at noon.
28	28,76	86	28,74	37	High wind at 10; cloudy; all day rain.
29	28,75	86	28,73	88	Cloudy; all day rain.
30	28,79	86	28,73	88	Cloudy; all day rain.
31	28,76	87	28,74	87	Ditto.
Aug. 1	28,84	83	28,74	84	Rain; in morning clear.
2	28,79	85	28,74	87	Fair all day.
3	28,78	85	28,75	88	Slight rain at 10; clear afterwards.
4	28,86	84	28,80	85	Clear at 10; rain morning.
5	28,86	85	28,76	84	Heavy rain at 1 P. M.
6	28,83	85	28,76	85	Clear all day till 4 P. M. slight rain.
7	28,82	84	28,74	85	Cloudy.
8	28,90	82	28,83	84½	Thunder storm and very heavy rain in the morning; clear after 10 A. M.
9	28,95	82½	28,85	84½	Fair all day, with clouds.
10	28,96	83½	28,85	86½	Fair all day, ditto.
11	28,92	84½	28,83	86	Ditto.
12	28,85	83½	28,75	85	Ditto.
13	28,80	82½	28,80	84½	Light rain in the morning; fair all day.
14	28,86	81½	28,80	84	Fair all day, with clouds.
15	..	..	28,80	83	Ditto.
16	28,90	82½	28,80	84½	Ditto.
17	28,86	84½	28,80	87	Ditto.
18	28,88	85½	..	..	Very cloudy in afternoon.
19	..	..	28,76	86½	Fair, with clouds and distant clouds.
20	28,85	82	28,76	84½	Fair, with clouds.
21	28,93	81	28,84	81	Heavy rain at night, and in morning.
22	28,90	81½	28,80	84	Fair, with clouds.
23	28,86	84	25,77	86	Ditto.
24	28,90	82	28,86	82	Ditto; west wind.
26	28,80	83	28,76	86	Ditto.
27	28,90	82	28,87	80	Rain at night and afternoon.
28	28,96	80½	28,88	83	Rain in morning; fair afternoon.
29	28,94	82	28,84	86	Fair.
30	28,89	82½	28,80	86	Strong westerly wind; fair.
31	28,86	82	..	..	Ditto.
Sept. 1	28,92	83	28,84	86	Ditto.
2	28,97	85	28,87	87	Ditto.
3	28,95	86	28,92	87	Wind and rain in the afternoon.
4	28,99	85	28,89	87	Fair.
5	28,93	85	28,85	87	Ditto.
6	28,92	84	28,83	86	Ditto.
7	..	..	28,78	88	Ditto.
8	28,90	83	28,82	84	Ditto.
9	28,90	83	28,80	86	Ditto.
10	28,91	83	28,84	86	Ditto.
11	..	..	28,90	84½	Ditto.
12	28,99	83	..	..	
13	29,00	83½	28,93	86	Ditto.

Meteorological Register kept at Bijnore, (Northern Moradabad,) by E. J. Ravenshaw, Esq. (continued.)

	At 10 A. M.		At 4 P. M.		Remarks.
	Bar.	Ther.	Bar.	Ther.	
Sept.14	29,00	83	28,95	87	Strong west wind in the morning.
15	29,03	83	28,97	87	Ditto west wind; fair.
16	29,04	80	28,96	87	Ditto; ditto; cloud of locusts.
17	28,96	83½	28,88	87	Ditto.
18	28,96	84	28,90	86	Fair.
19	29,07	84	29,03	86	Ditto.
20	29,13	83	29,05	87	Ditto.
22	29,03	79	..	..	Ditto.
23	29.10	82	29,00	84	
24	29,10	79½	29,00	82	
25	29,10	80	29,00	82	Rain about 1 P. M.; cloudy evening
26	29,10	79	29,04	82	Fair.
27	29,12	79	29,06	82½	Ditto.
28	29,16	81	29,10	83	Ditto.
29	29,23	80½	29,15	83	Ditto.
30	29,18	81	..	..	
Oct. 1	29,16	82	29,10	81½	Cloudy with rain.
2	29,15	79	29,9	82	Clouds.
3	29,16	81	29,9	84	Fair.
4	29,20	80	29,9	83	Ditto.
5	29,21	79	29,10	84	Ditto.
6	29,20	81	29,6	83	Ditto.
7	29,10	82	28,98	84	Ditto.
8	29,00	79	28,97	85	Ditto; high wind, W.
9	29,05	80	28,99	85	Ditto; ditto.
10	29,10	78	29,03	84	Ditto; ditto.
11	29,10	76	29,03	82	Ditto.
12	29,15	77	..	..	High easterly wind.
13	29,23	77	29,17	81	Fair; no wind.
14	29,23	71	29,19	80	Ditto.
15	29,25	76	29,20	80½	Ditto.
16	29,30	75	29,20	80	Ditto; W. breeze.
17	29,34	73½	29,23	78	
18	29,30	74	29,20	78	
19	29,27	72	..	..	
20	29,25	72	..	..	
21	29,26	73	29,19	71	
22	29,24	71½	29,18	78	
23	29,19	73	..	..	
24	29,16	72	..	..	
25	..	..	29,12	76	
26	29,24	72	29,20	71½	
27	..	..	29,23	71½	
28	29,31	74½	29,24	75	
29	29,36	75	..	..	
30	29,35	74	..	..	
31	29,24	73	..	..	Clouds in the evening.
Nov. 1	29,24	74	..	..	High easterly wind; clouds.
2	29,23	74	29,15	77	Ditto.
3	29,22	75	29,15	77½	Ditto.
4	29,24	73	29,16	75	Ditto.
5	..	..	29,22	75¾	
6	29,34	71	29,30	74	
10	..	..	29,20	75	Rain in the evening.
12	29,37	70	..	..	
26	29,33	68	..	..	
27	29,30	68	..	..	
29	29,32	69	..	..	Cloudy; wind easterly; light rain.
30	29,33	70	.	..	

N. B. Fever and ague prevalent from the beginning of September to end of October.

2.—*Meteorological Register kept at Mozufferpúr, Tirhoot, by T. Dashwood, Esq.*

Date.	Barometer.		Ther. in doors.		Ther. out of doors.		Wind.	Weather.
	9½ A.M.	4½ P.M.	9½ A.M	4½ PM	Mx.	Mn.		
Dec.								
1	29,76		69		78,5	60	E.	Clear, but foggy morning.
2	,71	29,67	69	73	79	57	W.	Clear, ditto.
3	,74	,67	67	71	78	60	E.	Clear; thick fogs.
4	,80	,68	68	71	75	59	W.	Clear, but drizzling rain in the morning.
5	,78	,70	67	70	73,5	57	W.	Clear all day.
6		,73		68	73	57	W.	Clear.
7	,78	,69	66	68	74	58	W.	Clear, with light clouds in the afternoon.
8	,72	,67	66	68	74	59	W.	Fair, with light floating clouds.
9	,77	,70	66	69	75	61	N. W.	Light floating clouds all day.
10	,77	,69	66	67	71,5	61	N. W.	Cloudy all day.
11	,77	,70	66	66	67,5	56	E.	Rainy morning, fog; but clear evening.
12	,75	,65	64	65	67,5	53	W.	Thick fog; clear evening, with high wind
13	,72	,70	62	62	66	47	W.	Clear, with morning fog.
14	,75	,66	61	63	67	53	E.	Fog, and clear day.
15	,71	,65	61	64	70	53	E.	Fog, but fine day.
16	,76	,66	60	66	72,5	55	E.	Clear.
17	,80	,70	63	65	73,5	55	E.	Clear.
18	,78	,67	62	65	70	52	W.	Clear.
19	,68	,64	61	63	68	50	W.	Clear.
20	,76	,66	60	63	68	47	W.	Clear.
21	,73	,65	59	62	67	49	W.	Clear.
22	,70	,61	60	63	68	52	W.	Clear, but morning fog.
23	,61	,59	60	63	70	49	W.	Clear.
24	,66	,60	60	63	71	53	E.	Clear.
25	,67	,66	60	64	73	49	W.	Clear.
26	,70	,66	59	62	66	45	W.	Clear.
27	,76	,68	57	61	66	48	W.	Clear.
28	,79	,70	58	61	67	47	W.	Clear.
29	,77	,69	58	61	67,5	45,5	W.	Clear.
30	,79	,72	57	60	65	42	W.	Clear.
31	,87	,78	54	59	62	41	W.	Clear.
Jan.								
1	29,96	29,86	55	57	62,5	43	W.	Clear; fine frosty.
2	,92	,80	55	58	64	45	W.	Clear; frosty.
3	,87	,74	55	58	66,5	50	W.	Clear; light clouds.
4	,86	,73	56	60	66,5	48	E.	Rainy morning, and cloudy afternoon.
5	,86	,80	56	60	71	49	E.	Fine, with light clouds.
s	,91	,83	57	62	72	53	E.	Fog, and clear day.
7	,90	,77	60	63	72	53	E.	Fog, and clear day, and west wind.
8	,79	,71	60	61	70	49	W.	Clear.
9	,81	,71	60	61,5	69	52	W.	Clear.
10	,85	..	59,5	..	70	54	E.	Clear.
11	,80	,69	61	65	71	54	W.	Clear.
12	,66	,60	61	65	73	53	W.	Clear.
13	,70	,60	61	65	73	55	E.	Fine, with light clouds.
14	,68	,60	62	65	73	51	W.	Clear, and strong west wind.
15	,79	,70	60	62	68	51	W.	Rain, and cloudy.
16	,66	,60	60	63	72	54	W.	Clear, and strong wind.
17	,72	,61	60	62	67	49	E.	Light clouds all day.
18	,73	,66	59	63	70	50	W.	Clear.
19	,78	,74	60	62	68	48	W.	Clear.
20	,83	,77	59	61	68	47	W.	Clear.
21	,88	,80	58	61	67	47	W.	Clear.
22	,87	,78	58	61	68	48	W.	Clear.
23	,86	,77	58	61	69	48	W.	Clear.
24	,90	,80	59	61	69,5	48	W.	Clear, and east wind in afternoon.
25	,90	,80	57	62	70	53	E.	Slight fog, and light cloudy afternoon.
26	,90	,80	60	63	71	53	E.	Clear, with flying clouds.
27	,89	,77	60	63	71	54	W.	Clear.
28	,90	,78	60	64	71,5	51,5	E.	Clear, and N. wind in afternoon..
29	,90	,80	61	64	73	55	E.	Foggy morning, and wind in afternoon.
30	,94	,70	62	66	74,5	56	E.	Fog and hazy all day, and wind afternoon.
31	,77	,67	64	67,5	76	58	S. E.	Clear.

Meteorological Register kept at Mozufferpúr, Tirhoot, by T. Dashwood, Esq. 1833.

Date.	Barometer.		Ther. in doors.		Ther. out of doors.		Wind.	Weather.
	9¾ A. M	4½ P. M.	9¾ A. M.	4½ P. M.	Mx.	Min.		
Feb.								
1	29,80	29,70	63	67	75	55	E.	Rainy morning, but clear day.
2	,79	,70	63	69	79	58	E.	Clear.
3	,80	,68	64	68	74	59	E.	Cloudy all day and rain in the night.
4	,88	,71	64	66	74	58	S. W.	Cloudy, a rainy morning, fair afternoon.
5	,67	,61	63	66	73	58	E.	Thick fog, and clear and W. wind in
6	,60	,60	64	66,5	71,5	51	W.	Thick fog, and clear day. [afternoon
7	,63	,59	62	68	70,5	53	W.	Clear.
8	,67	,59	62	67	74	53	W.	Clear, and strong wind.
9	,66	,59	63	66	74	53	W.	Clear, and afternoon cloudy & one show-
10	,60	,58	62,5	67	73	56	W.	Clear. [er of rain.
11	,60	,58	64	65	70	55	W.	Hazy and cloudy all day.
12	,69	,60	64	68	75,5	54	W.	Clear with strong wind.
13	,70	,60	63	69	77	52,5	W.	Clear with violent W. wind.
14	,70	,61	63	67	74,5	52	W.	Clear with violent W. wind.
15	,74	,61	63	66	72	51,5	W.	Clear.
16	,72	,63	62	66	72,5	50,5	W.	Clear. [of rain at night.
17		,63		67	76	52	E.	Hazy morning and clear day, and shower
18	,78	,66	65	70	73	53,5	E.	Strong wind and clear day.
19	,84	,73	62	68	76	55	W.	Fair.
20	,82	,75	65	68	77	53	E.	Clear morning and cloudy day.
21	,76	,66	64	68	77,5	55	W.	Clear morning and cloudy afternoon and
22	,74	,63	65	69	78	60	W.	Clear. [wind inclining to S. W.
23	,67	,60	67	71	80,5	55	W.	Clear.
24	,69	,61	66	71	79	56	W.	Clear.
25	,75	,66	66	70	79	56	W.	Clear.
26	,71	,60	67	73	81	58	W.	Clear, and strong wind.
27	,68	,60	67	72	81	54	W.	Clear, and strong wind.
28	,73	,60	66,5	72	80,5	57	W.	Clear.

2.—Indian Arts and Manufactures.

Glazed Pottery.

In an essay, published in the *Transactions of the Society of Arts*, by Mr. A. Aikin, occur the following speculations on the origin of the art of glazing earthen-ware, which he traces to China, and allows no higher a period of antiquity than the thirteenth century. That the art however was known in early ages to the Egyptians is proved by the frequent discovery of porcelain figures, enamelled or glazed in various colors, and it seems curious that this circumstance should not have been noticed by the author. Glazed tiles were certainly much used in ornamenting tombs and mosques by the Mohammedan conquerors of India, as most of our readers have had opportunities of seeing, in the Upper Provinces, and it would be worth while, in illustration of Mr. Aikin's remarks, to ascertain the age of the most conspicuous *dargáhs* of this nature.

" The ancient Greeks appear to have been wholly unacquainted with the art of covering earthen-ware with a vitreous glaze ; at least neither Pliny nor other authors say any thing on the subject, nor am I aware that any specimens of glazed ancient Greek or Roman pottery exist. For heating water and other liquids in, metallic vessels were generally employed : and for cold liquids, the natural porousness of the ware was corrected by a varnish of wax or resin, which may be seen on all the so-called Etruscan vases.

" Vitreous glazes, whether employed simply for closing the pores of baked clay, and thus rendering it impermeable to water, or with the further intention of concealing the coarseness and bad colour of the body by a covering of enamel, appear to have originated in China; for the earliest European travellers in that country make mention of temples covered and encrusted by varnished tiles of various colours.

" The invasion and conquest of China by ZENGHIS KHAN, in 1312, was probably the event that made known to the rest of Asia and to Europe the art of glazing earthen-ware. The empire of ZENGHIS extended from China across the Steppes or pastoral regions of Asia to the Caucasus, between the Black Sea and the Caspian, and his son OCTAI pushed through Russia into Poland and the confines of Germany. They likewise, in their victorious progress, held hostile or friendly intercourse with many of the Mohammedan sovereigns who possessed the countries to the south and west of them; and the whole Mohammedan world, though broken into independent, and frequently conflicting states, was nevertheless pressed into close union by the crusades, which had hardly yet subsided, and by the now imminent danger of Tartar conquest. The Moslems were also at this time not only a warlike but an active, ingenious, splendid, and inquisitive people, possessing a language, the Arabic, in a great measure common to all who professed the faith of Mohammed. The similarity of their architecture, in the wide extent of country from the Ganges to Gibraltar, shews not only a coincidence of feeling but a community of intercourse. It appears therefore to me by no means improbable, that an invention, which was largely and generally applied to decorative purposes in Mohammedan architecture, should have travelled in a few years from the confines of China to Spain.

" The palace of the Moorish kings at Granada, called *Alhambra*, was built in 1280, and many of the rooms are represented as ornamented by lacquered tiles. The tomb of SULTAN MAHOMMED KHODA-BENDEH, at *Sultánieh*, in Persia, was also built in the thirteenth century: and of this the cupola and minarets are still in many parts covered with a green lacquered tile, and the great architrave is formed of a dark-blue one.

" In 1475 was built the painted *masjid* in the now ruined city of *Gaur*, in India: it derived its name from the profusion of glazed tiles with which it was ornamented; specimens of which are preserved in the East-India Museum.

" The mother of SHAH ABBAS, about 1550, built a caravanserai at *Mayar*, near *Isfahán*, the front gate of which is inlaid with green tiles: and at present the domes of the mosques of that city are covered with green and blue tiles.

" MARCO POLO, the Venetian, visited in 1270 the Court of KUBLAI KHAN, the grandson of ZENGHIS, and remained in the employ of that sovereign for several years; at the same time, merchants from many of the commercial cities of Italy were travelling for the purpose of trade, in most of the countries between Syria and India. By some of these the art of covering baked earthen-ware with an opaque vitreous glaze might be imported into Italy; and Florence and its territory soon became celebrated for the fine works executed on plates of this ware, which met with a ready sale throughout Europe. The name given in France to these works was *faience*, supposed to have been derived from *Faenza*, a village near Florence, or perhaps the word is a mere corruption of *Firenze*, the Italian name of that city. TIRABOSCHI mentions one " LUCA DELLA ROBBIA, a Florentine, born in 1388,

who appears to have been the first who made figures of terra cotta and covered them with a varnish, to preserve them from the injuries of time and weather. He also adorned flat surfaces of terra cotta with various colours, and painted figures on them, by which he rendered himself so famous that he received orders for them from all parts of Europe."

However early the introduction of the art of glazing tiles in India may have been, it is certain that as regards vessels for holding liquors, it was little used, or at least that it has since become obsolete. Enamelling with various glazes on metal is still practised with great success up the country, but to common cheap pottery this branch of the art would be inapplicable. We have seen in Dr. Wise's Description of the Hooghly Ice Manufacture (vol. ii. page 80), that the cheap earthen dishes are only rendered impervious to water by smearing their interior with grease, or wax, as was customary in Spain and Italy, in olden times, and is even so in the present day. The clay of which the common earthen-ware is made in Bengal is of so fusible a nature that it would not stand the heat necessary for the application of what is called stone-glaze, made by the vapours of salt at an intense heat, and metallic glazes are too expensive for so cheap a commodity; still there are many cases in which it is most desirable to teach the native potters how to perform this useful process, and we therefore extract Mr. Aikin's short account of the various methods of glazing now in use in England. The *Khari-matti* or porcelain clay of the *Rajmahl* and *Vindya* hills has been applied to the manufacture of stone-ware bottles for soda-water, by Dr. J. Jeffreys, at *Farakhábád*, with perfect success; and this, being infusible, is capable of receiving the salt glaze, as described below, of the Vauxhall manufacture.

" I shall now proceed to give a brief account of the manufacture of the common red pottery ware as practised in the neighbourhood of London, and in various other parts of the kingdom; for the principal particulars of which, as well as for the specimens in illustration of it, I am indebted to Mr. Jones, of Lamheth. The material is a yellowish brown clay, from Deptford, there being no other near London on which the glaze will spread with the equality that is required. In general the clay is used without any addition; but such parcels as are too fat or tenacious are brought to a proper state by mixture with loam. The clay is watered and turned, but not being an alluvial clay, contains no stones, and therefore, does not require to be washed over. It is finally passed through the pug-mill in order to temper it. The required form of a pot or pan, or any other article, is given to it on the wheel, and the ware is dried under cover till it has acquired a considerable solidity. The glaze is then put on in the state of cream, by means of a brush, care being taken to cover the whole surface as evenly as possible: for small articles such as pipkins, that are glazed only internally, a little of the cream is poured in and then poured out again, a sufficient quantity of the glaze adhering to the surface of the ware.

" The materials of the glaze are galena, commonly called potter's lead-ore, ground to an impalpable powder, and then mixed with clay diffused in water, technically called slip. This glaze is transparent, and of a pale yellow colour, and consequently shews through it the colour of the ware; if a black opaque glaze is required, one part of common manganese is added to nine parts of galena. After the glaze is laid on, the ware is again dried, and is then piled in the kiln in order to be burnt or fired. For the first twenty-four hours a very low heat is applied, in order to drive

all the moisture out of the ware; it is then exposed for twenty-four hours more to a heat as high as it can bear without fusion, which has the effect of baking the clay, of driving off the sulphur from the lead-ore, and of causing the oxide of lead to form a frit or imperfect glass with the clay, the other ingredient of the glaze. The fire is now fed with bavin-wood instead of coal, by which the heat is increased, the furnace is filled with flame, and the frit being converted into a perfect glass, flows uniformly over the surface of the ware. The fire is then allowed to go out, and when the furnace has become cool, the contents are removed. If the air has been still during the burning, and due care has been observed, the articles in every part of the kiln will be properly baked; but a high wind always renders the heat very unequal, so that the ware in the windward part of the kiln will not be baked enough, while that in the leeward part will be over-burnt and run to a slag.

"All articles of earthen-ware which after being baked are opaque, are more or less porous; and if a heat somewhat approaching to their point of fusion, so as to render them slightly translucent, cannot safely be applied, it is evident that such ware is not very proper for vessels employed in cookery, and for several other purposes, from the difficulty of keeping them clean, and from their liability to crack when set on the fire in a damp state. In England, we endeavour to obviate this imperfection by means of a thick vitreous glaze; but as the ware itself is very fusible, the glaze must be still more so; and as oxide of lead forms the cheapest and most fusible glaze, this accordingly is the material universally employed by us. But there is a very serious objection to the use of this glaze, namely, that it is soluble in vinegar, in the juice of most fruits, especially when hot, and also in boiling fat; the consequence of which is, that the food of the lower classes, by whom alone cooking vessels of glazed red-ware are employed, is often contaminated with lead, so as seriously to impair their health by occasioning colics, and the other usual effects of lead poison. Possibly borax, which is now a cheap article and is very fusible, might be made to supersede the use of lead; if not, the only way of avoiding this very serious hazard to health, will be the use of more refractory clay, which, consequently, would allow the employment of a less fusible glaze free from lead. This has been done by Mr. Meigh, a potter in Staffordshire, to whom the Society awarded a medal for his invention; the ware produced by him is far superior to that in common use, and well deserves the encouragement of the public. A species of ware, somewhat superior to our common red-ware, is made at Lambeth, of Maidstone clay, being of a paler colour and a more compact texture than the latter, but does not take a uniform covering by the common glaze for red-ware; it is therefore chiefly used for purposes which admit its employment in an unglazed state, or in situations where the imperfection of the glaze is not perceived, as in ornamented chimney-pots, gas-consumers, &c.

"A more perfect, and indeed very excellent species of earthen-ware, is that called stone-ware, originally introduced from Holland, and now made in several parts of the kingdom, and especially at Lambeth. To one of the principal manufacturers of this ware, Mr. Wisker, I am indebted for the following particulars:

"The materials are, pipe-clay from Dorsetshire and Devonshire, calcined and ground flint from Staffordshire, and sand from Woolwich and Charlton.

"The clay is pulverized and sifted dry, and is either used alone, when an article of great compactness is required, as soda-water bottles, or is mixed with sand to diminish its contraction in the fire. For retorts and other large vessels, instead of sand, the refuse stone-ware, ground to a fine powder, is used. For the finer arti-

cles, such as figured jugs, ground flint is employed in place of sand. The composition is brought by the addition of water, to the state of mortar, and is then tempered in the pug-mill. All round articles are made on the horizontal wheel; and those of great size, *i. e.* of a greater capacity than two gallons, are at first of extraordinary thickness below to support the upper part; when they come off the wheel they are dried, and then put on the wheel again, and shaved down to a proper thickness. For oval, and other figures not circular, as pans for salting hams in, the clay is formed in a mould to the required shape. The drying, especially of large articles, must be very carefully performed; and as, from custom, the tops or bottoms of jars and various other vessels made of this ware, are required to be of a deeper brown than the natural colour of the materials, they are dipped in a mixture of red-ochre and clay slip. When perfectly dry they are piled in the furnace, bits of well-sanded clay being put between each piece to prevent them from adhering. A slow fire is kept up for twelve to twenty-four hours, according to the thickness of the ware, capable of bringing it just to a low red heat. The fire is then to be raised till the flame and the ware are of the same colour, and is so to be continued for several hours. At this time the glaze is added, which is done by pouring down the holes in the top of the kiln, twenty or thirty in number, ladlesful of common salt. This, being volatilized by the intense heat of the interior, attaches itself to the outer surface of the ware: here it is decomposed, the muriatic acid flying off, and the soda remaining behind in union with the earth, with which it forms a very thin, but, on the whole, a perfect glaze; at least quite sufficient, with the compactness of the ware, to render it completely proof against the percolation, not only of water, but of the strongest acids. So perfect, indeed, is the texture of the best ware now made, that it has of late been very largely used in the construction of distillatory vessels for manufacturing chemists, instead of green glass, as being more durable and also cheaper. Pickling jars, and many other vessels in which acid substances for food or condiment are kept, as also those earthen vessels in which great strength is required, are best made of stoneware. Vauxhall is the chief seat of this manufacture. There are now about eight houses engaged in this fabric, most of which are very actively employed, as the use of it is considerably on the increase."

In the porcelain of China, so justly celebrated for its beauty and excellence, the glaze is produced by a wash of clay of a kind more fusible than that of the body of the ware.

Three materials are known to be employed in this manufacture. 1. *Petuntse*, which is quarried from certain rocks and contains shining particles: (mica?) the lumps of this clay are broken up and ground in iron mortars, then lixiviated, and the creamy matter only used. Mr. Aikin supposes it to be a compact felspar; perhaps it may be a decomposing granite, from which the felspar is thus coarsely separated. 2. *Kaolin*, true porcelain clay, or decomposed felspar found in lumps in the clefts of mountains, covered with a reddish earth (just as it occurs in India). It is prepared for use like the *petuntse*. 3. *Hoaché*, which has a soapy feel, and is either steatite soapstone, or agalmatolite. It is also prepared in the same way, but is whiter, more transparent, and is used only for the more expensive wares.

For the finest porcelain, four parts of *hoaché* are added to one of *petuntse*. Sometimes the body is made of *kaolin*, dipped when dry into the cream of *hoaché*, which gives a white coat. *Hoaché* is also laid on with a pencil on the parts intended to have an ivory-white colour.

"The white semi-transparent glaze is thus prepared. The whitest *petuntse* with green spots is pulverized and washed over; to 100 parts of the cream thus obtained is added one part of *che-kao* (burnt alum) previously pulverized. A caustic ley is also prepared into which *che-kao* is stirred, and the cream thus produced is collected. The two creams are mixed together in the proportion of ten measures of the former to one of the latter, and this composition, washed over the dry unbaked ware, gives it its whiteness and lustre. A brown glaze is made of common yellow clay added to the above. The Chinese porcelain is never brought to the state of biscuit, by a prior baking, before it is glazed.

"The flux used with colours laid on the glaze is made of one part calcined quartz and two parts ceruse. Red is given by peroxide of iron, and a finer red by copper, but the process is not known. The enamel colours are brought to a proper consistence by a solution of glue, except those containing ceruse, which can only be tempered with water*."

3.—*Phenomenon of the Japanese Mirror.*

The Philosophical Magazine of Dec. 1832 contains Sir D. Brewster's explanation of the magical effect of the mirror, of which a notice was published by myself in vol. 1. p. 242.

Sir David had only received a written description from Mr. G. Swinton, and therefore it was hardly fair to expect him to give a categorical reply to that gentleman's question, "how are these strange effects produced?" After alluding however to Mr. Swinton's conjecture that the phenomena may originate in a difference of density in different parts of the metal, occasioned by the stamping of the figures on the back, which, if metals were absolutely opaque, and if the lights they reflect never entered their substance, would, he says, be the only possible way in which the stamped figures could be reflected,—the learned Doctor proceeds to offer his own theory.

"I believe, however, on the authority of the phenomena of elliptical polarization, that in silver nearly one-half of the reflected light has entered the metal, and in other metals a less portion. So that we may consider the surface of every metal as transparent to a certain depth, a fact which is also proved by the transparency of gold and silver leaf. Now this thin film having its parts of variable density, in consequence of the stamping of the figure, might reproduce the figure by reflection. It is well known that silver *polished by hammering* acts differently upon light from silver that has received a *specular polish*; and I have elsewhere† expressed the opinion that a parabolic reflector of silvered copper, polished by hammering, will from the difference of density of different parts of the reflecting film, produce at the distance of many miles a perceptible scattering of the reflected rays, similar to what takes place in a transparent fluid or solid, or gaseous medium. I am satisfied, however, that at the distance of a few inches from the Chinese mirror, this evanescent effect will be altogether imperceptible, and that we must seek for another cause of the phenomenon under consideration.

"Some years ago I had occasion to observe the light of the sun reflected upon paper from a new and highly polished gilt button, and I made a drawing at the time of the figure, which appeared in the spectrum. It consisted of radiations exactly like the spokes of a carriage wheel, the radiations being *sixteen* in number, and a little confused in the centre opposite the eye of the button. On the back of this button several words were deeply stamped, but these words did not appear in the reflected image.

* *Trans.* Soc. Arts and Repository of Inventions. † Ed. Trans. vol. xi. p. 47.

I have since examined several varieties of such buttons, and I find that they almost all give either radiations or great numbers of narrow concentric rings, (and sometimes both,) whose centre is the centre of the button, and the smallest one of which is always like a dimple in the centre.

"Upon examining the surface of these buttons in the sun's light, and at the edge of a shadow*, I have invariably been able to see the same rings excavated in the polished face that appeared in the luminous image, which it reflected. They obviously arise from the button being finished in a turning lathe, and the rings are produced by the action of the polishing powder, or probably in some cases they may be the grooves of the turning tool, which have not been obliterated by the subsequent processes†.

"These facts will, I presume, furnish us with the secret of the Chinese mirror. Like all other conjurors, the artist has contrived to make the observer deceive himself. The stamped figures on the back are used for this purpose. The spectrum in the luminous area *is not an image of the figures on the back*. The figures are a copy of the picture which the artist *has drawn on the face of the mirror*, and so concealed by polishing that it is invisible in ordinary lights, and can be brought out only in the sun's rays.

"Let it be required, for example, to produce the dragon described by Mr. Swinton as exhibited on one of these Chinese mirrors. When the surface of the mirror is ready for polishing, the figure of the dragon may be delineated upon it in extremely shallow lines, or it may be eaten out by an acid much diluted, so as to remove the smallest possible portion of the metal.

"The surface must then be highly polished, not upon pitch, like glass and specula, because this would polish away the figure, but upon cloth, in the way that lenses are sometimes polished. In this way the sunk part of the hollow lines will be as highly polished as the rest, and the figure will only be visible in very strong lights, by reflecting the sun's rays from the metallic surface. When the space occupied by the figure is covered by lines or by etching, the figure will appear *in shade* on the wall, and vice versâ."

In spite of the overwhelming authority opposed to me, I feel reluctant to give up the theory I ventured to advance, in explanation of the anomaly in question, and I am emboldened to maintain it by the simple fact, that Sir David had not yet seen the mirror: indeed in this respect we stand an equal ground;—the mirror was gone from Calcutta *before* I had attempted to solve its nature: it had not arrived when Dr. Brewster offered his ingenious theory. The best arguments which I can advance in favor of my own are—1, that the mirror underwent several rude processes of polishing in Calcutta, so much so, that most of its *silvered surface* was worn off, and yet its reflective faculties were unimpaired. 2, no signs of engraving were observed on the surface, under the strongest horizontally reflected light, which ought to have shewn its presence as explained, by Sir David.

Dr. Brewster's theory cannot fail however to win converts: it would be presumption in me to go farther in opposing it, than to request a suspension of judgment until the mirror shall have arrived in England; meanwhile its magical powers must continue, as he says, "to perplex the philosophers of our eastern metropolis!"

* "By this method the figure in the Chinese mirror could be rendered visible *beneath its polish*."

† "In polished *steel* buttons the reflected light is crowded with lines running at right angles, indicating the cross strokes by which they have been ground and polished."

Meteorological Register kept at the Assay Office, Calcutta, for the month of April, 1833.

Day of the month.	Barometer reduced to 32° Farh.				Thermometer in the Air.					Depression of moist-bulb Thermometer.				Hair Hygrometer.		Rain.	Wind.			Weather.		
	At 5 A. M.	At 10 A. M.	At 4 P. M.	At 10 P. M.	Minimum at 5 A. M.	At 10 A. M.	Max. by reg. Ther.	At 4 P. M.	At 10 P. M.	At 5 A. M.	At 10 A. M.	At 4 P. M.	At 10 P. M.	At 10 A. M.	At 4 P. M.	Inches.	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1	,835	,862	,783	,808	77,2	85,5	95,8	91,4	79,2	2,7	6,6	14,5	4,2	91	75		s.	S.	S.	scud.	hazy.	hazy.
2	,890	,851	,695	,872	79,	86,	96,	92,0	80,1	2,8	6,5	8,5	3,7	91	87		s.	S.	S.	clear.	clear.	do
3	,787	,801	,656	,709	76,8	85,6	99,2	93,8	80,2	1,8	6,0	11,7	3,0	92	80		S.	S.	S.	do	do	do
4	,653	,707	,577	,657	78,1	88,6	96,8	92,	80,2	3,3	6,7	8,3	3,6	91	88		s.	S.	S.	do	do	heavyscud
5	,645	,775	,668	,738	77,	88,0	1025	92,4	82,3	2,2	7,5	16,7	5,4	90	67		s.	S.	S.	cloud	do	clear.
6	,671	,784	,675	,752	79,	87,4	92,4	91,8	81,5	1,8	6,2	8,6	4,3	92	88		S.	S.	S.	cum.	do	hazy.
7	,720	,820	,682	,815	80,2	87,6	101,	92,	82,3	3,2	6,2	10,0	5,8	92	80		S.	s.	s.	clear.	do	s.wd.a ngt.
8	,814	,861	,690	,780	78,7	88,	101,	92,0	80,	2,5	6,3	13,6	4,8	91	74		o.	o.	s.		do	clear,
9	,743	,822	,660	,720	79,	87,2	97,	91,8	80,	3,6	7,4	14,6	5,0	91	76		s.	s.	s.		do	do
10	,696	,733	,620	,709	78,6	87,0	95,	92,6	79,7	4,6	7,3	11,4	5,7	90	82		s.	s.	s.		do	do
11	,675	,700	,640	,701	77,	86,6	93,4	90,4	80,7	3,9	7,2	11,0	5,0	90	84		S.	S.	S.	cum.	hazy.	do
12	,654	,765	,670	,755	79,	87,7	95,2	90,8	75,3	3,3	7,0	9,0	5,2	90	86	1.40	S.	S.	s. e.	scud.	do	n.w.a 8 rn.
13	,750	,808	,733	,819	74,5	86,4	93,	83,7	71,	4,5	5,0	6,8	2,8	94	89	1.55	s e.	s. e.	w. e.	rain	v. w.	n. at3pmcl
14	,762	,830	,720	,842	74,2	85,	91,	87,	77,2	3,8	5,1	8,0	6,6	94	87		s.	o.	n. e.	cloudy	fair	stratus.
15	,800	,852	,710	,784	74,3	83,5	92,	89,8	79,8	3,0	5,2	10,1	3,0	95	86		n,	s. e.	s,	cumuli.	clear.	nwr. rain.
16	,756	,800	,668	,793	77,8	85,5	92,2	88,7	83,	3,6	4,8	7,5	5,6	94	90	0.17	s.	s.	s.	do	do	s. gatherg.
17	,682	,737	,637	,697	74,4	85,4	90,	88,7	81,	3,3	5,0	6,8	3,8	93	92		s.	s.	S.	clear	do	cumuli.
18	,684	,721	,595	,698	80,	86,3	93,	90,7	83,5	3,6	5,0	6,5	5,1	92	92		S.	s.	S.	cum str.	do	clear.
19	,603	,647	,525	,602	81,1	88,	98,	90,5	81,	1,9	5,4	6,5	4,0	93	92		S.	S.	S. E.	clear	stm. gat.	dgy squal.
20	,587	,705	,595	,647	82,2	88,	95,	92,0	82,	4,0	5,2	10,0	4,2	94	85		S.	S.	S.	cumuli	clears.	clear.
21	,537	,720	,630	,684	80,4	90,2	98,	93,	82,	2,5	5,4	12,0	3,4	94	90		o.	s.	s. w.	clear	do	do
22	,646	,747	,650	,741	80,	88,	102,	92,5	83,3	2,5	5,7	14,6	5,0	93	75		s. w.	s.	s. w.	do	cumuli.	do
23	,692	,776	,670	,725	80,	90,2	103,	94,1	82,1	2,0	5,7	13,5	3,3	94	81		w.	s.	S.	scud s.	do	do
24	,671	,730	,626	,635	79,8	90,	1045	94,6	83,3	1,8	8,0	15,4	5,8	89	75		s.	s.	S.	clear	clear,	do
25	,595	,614	,571	,618	81,5	89,5	104,	93,7	81,	3,9	7,4	18,0	2,4	90	69		s. w.	s.	s.	cumuli	cum.	do
26	,597	,712	,638	,678	80,	90,2	99,4	93,8	84,2	3,0	7,5	10,5	5,6	90	81		s.	s.	S.	cirri.	do	bank s. e.
27	,627	,730	,587	,650	82,	88,8	1008	93,6	81,	4,1	6,0	10,4	4,0	92	86	0.40	S.	s.	E.	cumuli.	gath. rn.	clear.
28	,646	,740	,620	,684	81,	88,7	1018	93,5	82,2	3,0	6,2	10,3	3,0	91	86		s.w.	o.	S.	clear	clear.	do
29	,665	,746	,642	,700	80,	88,7	95,6	93,3	83,2	1,8	6,3	10,2	5,2	90	85		s.	w.	S.	do	do	scud.
30	,676	,744	,640	,710	81,7	88,5	97,	93,4	83,0	4,6	7,0	10,2	4,6	91	85		s.	S.	S.	do	clouds.	
Means,	,692	,765	,650	,699	78,8	87,5	97,2	1,6	80,8	2,8	6,2	10,8	4, 4	92	83	3.52	south monsoon.			frequent storms.		

The Instruments for 10 A. M. and 4 P. M. are suspended in the free air of the laboratory, and the Sunday entries are filled in by interpolation. The instruments for 5 A. M. and 10 P. M. are observed daily in the south veranda of a house near the Cathedral. The Barometer for 10 A. M. and 4 P. M. stood during March on an average .042 lower than that at the surveyor general's office, but as the daily differences vary from +.007 to—.083 when even the indications of the latter are reduced to the freezing point, it is impossible to reconcile them. The force of wind is represented by the size of the type used.